FUTURE KIDS

GROW With MATHS

Part 8

Grow with Maths – 8

Chapter – 1 Rational Numbers

Exercise – 1.1

1. Which of the following are rational numbers? Give reasons:

a) $\frac{-14}{1}$ -14 is a rational number as -14 and 1 are integers and $1 \neq 0$.

b) $\frac{14}{-20}$ 14 is a rational number as 14 and – 20 are integers and $-20 \neq 0$.

c) $\frac{19}{119}$ 19 is a rational number as 19 and 119 are integers and $119 \neq 0$.

d) $\frac{-15}{0}$ -15 is not a rational number as the denominator is 0.

e) $\frac{-5}{7}$ -5 is a rational number as -5 and 7 are integers and $7 \neq 0$.

2. Which of the following are in the standard form? If no, change them into standard form:

a) $\frac{16}{-4}$ is not in standard form.

b) $\frac{18}{29}$ is in standard form.

c) $\frac{11}{21}$ is in standard form.

d) $\frac{20}{27}$ is in standard form.

e) $\frac{13}{-17}$ is not in standard form.

f) $\frac{119}{65}$ is in standard form.

g) $\frac{17}{-85}$ is not in standard form.

h) $\frac{7}{9}$ is in standard form.

3. Do it yourself.

4. Fill in the blanks:

a) $\frac{11}{12} = \frac{\mathbf{66}}{72} = \frac{33}{\mathbf{36}}$

b) $\frac{3}{13} = \frac{12}{\mathbf{52}} = \frac{\mathbf{9}}{39}$

c) $\frac{-12}{\mathbf{24}} = \frac{4}{\mathbf{-7}} = \frac{\mathbf{21}}{-42}$

d) $\frac{\mathbf{-30}}{-9} = \frac{10}{3} = \frac{-300}{\mathbf{-90}}$

5. Which of the following is greater?:

(a) $\frac{-4}{9}, \frac{-5}{12}$ LCM is 36.

$\frac{-4}{9} = \frac{-16}{36}$, and $\frac{-5}{12} = \frac{-15}{36}$

So, -15 > -16

Clearly $\frac{-5}{12}$ is greater.

(b) $\frac{2}{5}, \frac{5}{5}$ LCM is 5 (or denominator is same)

Since 5 > 2, Clearly $\frac{5}{5}$ is greater.

(c) $\frac{-13}{21}, \frac{21}{12}$ LCM is 84.

$\frac{-13}{21} = \frac{-52}{84}$, and $\frac{21}{84} = \frac{147}{84}$

So, 147 > -52

Clearly $\frac{21}{12}$ is greater.

(d) $\frac{-1}{9}, \frac{-20}{18}$ LCM is 18.

$\frac{-1}{9} = \frac{-2}{18}$, and $\frac{-20}{18} = \frac{-20}{18}$

So, -2 > -20

Clearly $\frac{-1}{9}$ is greater.

6. Which of the following is smaller?

a) $\frac{-7}{8}, \frac{13}{8}$ LCM is 8 (or denominator is same)

Since -7 < 13, Clearly $\frac{-7}{8}$ is smaller.

(b) $\frac{10}{12}, \frac{9}{20}$ LCM is 60.

$\frac{10}{12} = \frac{50}{60}$, and $\frac{9}{20} = \frac{27}{60}$

So, 27 < 50

Clearly $\frac{9}{20}$ is smaller.

c) $\frac{7}{7}, \frac{9}{7}$ LCM is 7 (or denominator is same)

Since 7 < 9, Clearly $\frac{7}{7}$ is smaller.

d) $\frac{-2}{9}, \frac{6}{18}$ LCM is 18.

$\frac{-2}{9} = \frac{-4}{18}$, and $\frac{6}{18} = \frac{6}{18}$

So, $-4 < 6$

Clearly $-\frac{2}{9}$ is smaller.

7. Arrange following in ascending order:

a) $\frac{-11}{12} < \frac{-13}{21} < \frac{-13}{-24} < \frac{-7}{12}$

b) $\frac{-11}{9} < \frac{-13}{18} < \frac{-3}{-16} < \frac{17}{20}$

8. Arrange the following in descending order:

a) $\frac{-17}{-8} > \frac{15}{16} > \frac{12}{24} > \frac{1}{40}$

b) $\frac{8}{21} > \frac{2}{45} > \frac{-1}{21} > \frac{-7}{15}$

Exercise – 1.2

1. Find the value of the following:

a) $5^{3/5} \times 5^{4/5} = 5^{(3/5+4/5)} = 5^{7/5}$

b) $\frac{125^{1/3}}{5^2 \times 125^0} = \frac{\sqrt[3]{125}}{5^2 \times 1} = \frac{5}{5^2} = \frac{1}{5}$

c) $\frac{64^{7/9}}{125^{8/9}} = \frac{(2^6)^{7/9}}{(5^3)^{8/9}} = \frac{2^{42/9}}{5^{24/9}}$

$= \frac{2^{14/3}}{5^{8/3}} = \left[\frac{2^{14}}{5^8}\right]^{1/3}$

d) $\left[\frac{2}{3}\right]^{5/8} \div \left[\frac{16}{81}\right]^{15/32} = \frac{2^{5/8}}{3^{5/8}} \times \frac{(3^4)^{15/32}}{(2^4)^{15/32}}$

$= \frac{2^{5/8}}{3^{5/8}} \times \frac{(3)^{60/32}}{(2)^{60/32}} = \frac{2^{5/8}}{3^{5/8}} \times \frac{(3)^{15/8}}{(2)^{15/8}}$

$= \frac{3^{10/8}}{2^{10/8}} = \left[\frac{3}{2}\right]^{5/4}$

e) $\left[6^{-2/3}\right]^{-3/2} = 6^{6/6} = 6$

f) $\left[\left[\frac{27}{216}\right]^{-4/6}\right]^{3/5} = \left[\frac{1}{8}\right]^{-12/30}$

$= \frac{(1)^{-2/5}}{(2^3)^{-2/5}} = \frac{1^{-2/5}}{2^{-6/5}}$

g) $\frac{27^{-1/3}}{2^{-5/2} \times 8^{-3/2}} = \frac{3^{-1} = 2^7}{2^{-7} \quad 3} = \frac{128}{3}$

h) $8^{5/8} \times 27^{7/6} \times 2^{1/3} = 2^{15/8} \times 2^{1/3} \times 3^{7/2}$

$= 2^{53/24} \times 3^{7/2}$

i) $\left[8^{-2/5}\right]^{-3/2} \left[32^{-5}\right]^{-1/5} = 8^{6/10} \times 32$

$= (2^3)^{3/5} \times 2^5 = 2^{9/5} \times 2^5 = 2^{34/5}$

2. Evaluate:

(a) $(0.49)^{1/2} = [(0.7)^2]^{1/2}$

$= (0.7)^{2\times1/2} = 0.7$

(b) $(0.125)^{4/3} = [(0.5)^3]^{4/3}$

$= (0.5)^{3\times4/3} = (0.5)^4$

$= 0.0625$

(c) $(0.0081)^{5/4\ -1/2} = [(0.3)^4]^{-5/8}$

$= (0.3)^{-20/8} = (0.3)^{-5/2}$

or $(0.00243)^{-1/2}$

(d) $[(0.064)^{1/3}]^{1/2} = (0.064)^{1/6}$

$= [(0.4)3]^{1/6} = (0.4)^{3/6}$

$= (0.4)^{1/2} = (0.4)^{1/2}$

3. Simplify and express the following with positive exponent:

a) $[x^{-1/2}]^{1/3} = [x^{-1/6}] = \left[\frac{1}{x}\right]^{1/6}$

b) $\frac{x^5 \times y^{8/7}}{x^3 \times y^{-5/7}} = x^{5-3} \times y^{8/7+5/7} = x^2 y^{13/7}$

c) $\frac{x^{-5/2} \times y^{-4}}{x^{-3/2} \times y^{-2}} = x^{-5/2+3/2} \times y^{-4+2}$

$= x^{-1} \times y^{-2} = \frac{1}{x\,y^2}$

d) $\{\sqrt[3]{(1/x)^{-6}}\}^{1/2} = \{(1/x)^{-6x1/3}\}^{1/2}$

$= (1/x^{-2})^{1/2} = x$

4. Simplify the following :

a) $\frac{\sqrt{x^5} \times \sqrt{x^6}}{\sqrt{y^2}\ \sqrt{x^{-2}y^{-4}}} = \frac{(x^5)^{1/2} \times (x^6)^{1/2}}{(y^2)^{1/2}\ (x^{-2}y^{-4})^{1/2}}$

$= \frac{x^{5/2} \times x^3}{x^{-1}y^{-1}} = \frac{x^{11/2}}{x^{-1}y^{-1}} = \frac{x^{(11/2)+(1)}}{y^{-1}}$

$= x^{13/2}y$

b) $\frac{\sqrt{64x^3y^5}}{\sqrt{16x^5y^7}} = \frac{(4x^3y^5)^{1/2}}{(x^5y^7)^{1/2}}$

$= \frac{2x^{3/2}y^{5/2}}{x^{5/2}y^{7/2}} = 2x^{3/2)-(5/2)}y^{5/2)-(7/2)}$

$= 2x^{-1}y^{-1} = \frac{2}{xy}$

5. Express the following as radicals:

a) $(21)^{-1/3} = \frac{1}{\sqrt[3]{21)}}$

b) $(29)^{2/3} = = \sqrt[3]{29^2}$

c) $(-36)^{1/7} = \sqrt[7]{(-36)}$

d) $(27)^{1/3} = \sqrt[3]{27}$

6. Find out the pure and mixed radicals:

a) $\sqrt{4}$ = Pure radical, no factor other than 1.

b) $2\sqrt{6}$ = Mixed radical, having product other than 1.

c) $4\sqrt{3}$ = Mixed radical, having product other than 1.

d) $\sqrt{16}$ = Pure radical, no factor other than 1.

e) $\sqrt{15}$ = Pure radical, no factor other than 1.

f) $13 \times \sqrt[3]{15}$ = Mixed radical, having product other than 1.

g) $\sqrt{18}$ = Pure radical, no factor other than 1.

h) $\sqrt{19}$ = Pure radical, no factor other than 1.

7. Rationalize the denominator in:

a) $\frac{5-\sqrt{3}}{5+\sqrt{3}} = \frac{5-\sqrt{3}}{5+\sqrt{3}} \times \frac{5-\sqrt{3}}{5-\sqrt{3}}$

$= \frac{(5-\sqrt{3})^2}{(5)^2-(\sqrt{3})^2} = \frac{25-10\sqrt{3}+3}{25-3}$

$= \frac{28-10\sqrt{3}}{22} = \frac{14-5\sqrt{3}}{11}$

b) $\frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}} = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}} \times \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}+\sqrt{2}}$

$= \frac{(\sqrt{3}+\sqrt{2})^2}{(\sqrt{3})^2-(\sqrt{2})^2} = 3+2\sqrt{6}+2$

$= 5+2\sqrt{6}$

c) $\frac{7-\sqrt{5}}{\sqrt{5}} = \frac{7-\sqrt{5}}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{7\sqrt{5}-5}{5}$

d) $\frac{\sqrt[4]{5+6}}{\sqrt{10}+\sqrt{2}} = \frac{\sqrt[4]{5+6}}{\sqrt{10}+\sqrt{2}} \times \frac{\sqrt{10}-\sqrt{2}}{\sqrt{10}-\sqrt{2}}$

$= \frac{(\sqrt[4]{5}+6)(\sqrt{10}-\sqrt{2})}{8}$

8. Rationalize the denominator in:

a) $\frac{5}{\sqrt{3}} = \frac{5 \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}} = \frac{5\sqrt{3}}{3}$

b) $\frac{2\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3} \times \sqrt{8}}{\sqrt{3} \times \sqrt{8}} = \frac{2\sqrt{24}}{8}$

$= \frac{2\sqrt{6}}{4} = \frac{\sqrt{6}}{2}$

c) $\frac{7}{3\sqrt{5}} = \frac{7}{3\sqrt{5}} \times \frac{3\sqrt{5}}{3\sqrt{5}} = \frac{21\sqrt{5}}{45}$

$= \frac{7\sqrt{5}}{15}$

d) $\frac{4}{\sqrt{12}} = \frac{4 \times \sqrt{12}}{\sqrt{12} \times \sqrt{12}} = \frac{4\sqrt{12}}{12}$

$= \frac{2\sqrt{3}}{3}$

9. If $\sqrt{2} = 1.414$, find the values of each of the following:

a) $\frac{6}{\sqrt{2}} = \frac{6}{1.414} = \frac{3}{0.707} = \frac{3000}{707} = 4.243$

b) $\frac{3}{\sqrt{2}-1} = \frac{3}{1.414 - 1} = \frac{3}{0.414}$

$= \frac{3000}{414} = 7.246$

c) $\frac{7}{\sqrt{2}-1} = \frac{7}{1.414 - 1} = \frac{7}{0.414}$

$= \frac{7000}{414} = 16.908$

d) $\frac{2+\sqrt{2}}{2-\sqrt{2}} = \frac{2+1.414}{2-1.414} = \frac{3.414}{0.586}$

$= \frac{1.707}{293} = 5.8259$

10. Check whether the statements are true or false:

a) True b) False c) False

Exercise – 1.3

1. Write the base and the exponent in each of the following:

a) Base = 0, Exponent = 4

b) Base = 4, Exponent = -6

c) Base = 8/9, Exponent = -7

d) Base = -2, Exponent = 6

e) Base = 2/6, Exponent = -6

f) Base = $\sqrt{}$ 4/3, Exponent = -8

g) Base = $\sqrt{}$ 3, Exponent = 0

h) Base = $1/\sqrt{}$ 5, Exponent = 0

2. Write in exponential form:

a) $2 \times 2 \times 2 \times 2 \times 5 = 2^5$

b) $\sqrt{3} \times \sqrt{3} \times \sqrt{3} \times \sqrt{3} = (\sqrt{3})^4$

c) $\frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} = \left[\frac{1}{4}\right]^3$

d) $\frac{16}{81} = \left[\frac{4}{9}\right]^2$

e) $\left[\frac{-2}{3}\right] \times \left[\frac{-2}{3}\right] \times \left[\frac{-2}{3}\right] = \left[\frac{-2}{3}\right]^3$

f) $5^2 \times 5^2 \times 5^2 \times 5^2 = (5)^8$

3. Simplify the following and express the answer in exponential form:

a) $2^{17} \div 2^{13} = 2^{17-13} = 2^4$

b) $4^{-6} \times 4^8 \times 4^{-1} = 4^{-6+8-1} = 4^1$

c) $\left[\frac{1}{\sqrt{3}}\right]^4 \times \left[\frac{1}{\sqrt{3}}\right]^{-1} \times \left[\frac{1}{\sqrt{3}}\right]^{-3} = \frac{1}{\sqrt{3}^1}$

d) $(2^8)^{-4} = 2^{-32}$

e) $(\sqrt{6})^{-5} \times (\sqrt{6})^{-1} \times (\sqrt{6})^{-7} = (\sqrt{6})^{-13}$

4. Simply the following by using the laws of exponents:

(a) $x^5 \times x^{-3} \times x^6 \times x = x^{12-3} = x^9$

(b) $\frac{100^{-4}}{100-2} = 100^{-4+2} = \frac{1}{10000}$

(c) $\frac{3^{-5} \times a^{-6} \times b^{-4}}{3^{-6} \times a^{-5} \times b^{-3}} = 3^{-5+6} \times a^{-6+5} \times b^{-4+3}$

$= 3 \times a^{-1} \times b^{-1}$

5. Simply the following:

(a) $3 \times 3 \times 3$ .....10 times. $= 310$

(b) $\frac{\sqrt{4}}{5} \times \frac{\sqrt{4}}{5} \times \frac{\sqrt{4}}{5} \times \frac{\sqrt{4}}{5} = \frac{(\sqrt{4})^4}{5^4} = \frac{16}{625}$

(c) $\left[-\frac{3}{7}\right]^3 \times \left[-\frac{3}{7}\right]^{10} \times \left[-\frac{3}{7}\right]^5 = \left[-\frac{3}{7}\right]^{18}$

(d) $\left\{\left[\frac{1}{3}\right]^{-4}\right\}^{1/4} = \left[\frac{1}{3}\right]^{-1}$

6. Solve the following exponential equations:

(a) x = 6 (b) x = 4

(c) x = 6 (d) x = 3

(e) $x = \frac{1}{2}$

Revision Exercise

1. Tick (✓) the correct option:

a) (iii) 1 b) (ii) 6

c) (i) 2/4 d) (iii) 3/4

e) (ii) 7/3 f) (iii) 1/8

2. Which of the following rational numbers are positive?

(a) $\frac{7}{5}$ (c) $\frac{-18}{-13}$

3. Which of the following rational numbers are negative?

(a) $\frac{-16}{23}$ (c) $\frac{21}{-25}$

4. Simplify the following using laws of exponents:

(a) $3^2 \times 3^3 = 3^{3+2} = 3^5 = 243$

(b) $3^3 \div 3^2 = 3^{3-2} = 3^1 = 3$

(c) $(2^4)^3 = (2)^{4\times 3} = 2^{12} = 4096$

(d) $(3\times 5)^2 = (15)^2 = 225$

5. Simplify the following using laws of exponents:

(a) $4^{-2} \times 3^{-3} = \frac{1}{4^2} \times \frac{1}{3^3} = \frac{1}{16} \times \frac{1}{27} = \frac{1}{432}$

(b) $\left[\frac{2}{5}\right]^{-3} \div \left[\frac{2}{5}\right]^{-2} = \left[\frac{5}{2}\right]^{3} \div \left[\frac{5}{2}\right]^{2}$

$= \left[\frac{5}{2}\right]^{3-2} = \frac{5}{2}$

Chapter – 2 Powers and Exponents

Exercise – 2.1

1. Find the value of following:

a) $(9)^{-3} = \frac{1}{9^3} = \frac{1}{729}$

b) $\left[\frac{3}{5}\right]^3 = \frac{3^3}{5^3} = \frac{27}{127}$

c) $\left[\frac{9}{7}\right]^{-2} = \frac{9^{-2}}{7^{-2}} = \frac{7^2}{9^2} = \frac{49}{81}$

d) $\left[\frac{11}{6}\right]^3 = \frac{11^3}{6^3} = \frac{1331}{216}$

e) $\left[\frac{9}{13}\right]^{-2} = \frac{9^{-2}}{13^{-2}} = \frac{13^2}{9^2} = \frac{169}{81}$

f) $\left[\frac{5}{2}\right]^4 = \frac{5^4}{2^4} = \frac{625}{16}$

g) $\left[\frac{16}{17}\right]^{-3} = \frac{16^{-3}}{17^{-3}} = \frac{17^3}{16^3} = \frac{4913}{4096}$

h) $\left[\frac{2}{2}\right]^3 = \frac{2^3}{2^3} = 1$

2. Express the given as power notation:

(a) $\frac{-125}{64} = \left[\frac{-5}{4}\right]^3$

(b) $\frac{9}{4} = \left[\frac{3}{2}\right]^2$

(c) $\frac{16}{81} = \left[\frac{4}{9}\right]^2$

(d) $\frac{-8}{343} = \left[\frac{-2}{7}\right]^3$

(e) $\frac{125}{216} = \left[\frac{5}{6}\right]^3$

(f) $\frac{32}{243} = \left[\frac{2}{3}\right]^5$

(g) $\frac{49}{4} = \left[\frac{7}{2}\right]^2$

(h) $\frac{25}{9} = \left[\frac{5}{3}\right]^2$

3. Write down the reciprocal or multiplicative inverse of the following:

(a) $\left[\frac{7}{9}\right]^5 = \frac{9^{-5}}{7}$

(b) $\left[\frac{10}{9}\right]^{13} = \left[\frac{9}{10}\right]^{-13}$

(c) $\left[\frac{19}{5}\right]^{-3} = \left[\frac{5}{19}\right]^3$

(d) $\left[\frac{6}{15}\right]^{-2} = \left[\frac{15}{6}\right]^2$

4. Find the value of the following:

(a) $\left[\frac{4}{-5}\right]^{-2} \times \frac{16}{25} = \left[\frac{5}{4}\right]^2 \times \left[\frac{4}{5}\right]^2 = 1$

(b) $\left[\frac{-2}{3}\right]^4 \times \left[\frac{9}{8}\right]^2 = \frac{2^4}{3^4} \times \frac{3^4}{2^6}$

$= \frac{1}{2^2} = \frac{1}{4}$

(c) $\left[\frac{-1}{5}\right]^3 \times (-1)^{17} \times \left[\frac{2}{5}\right]^3 = \frac{-1}{5^3} \times \frac{-1}{} \times \frac{2^3}{5^3}$

$= \frac{2^3}{5^6} = \frac{8}{15625}$

(d) $\left[\frac{1}{2}\right]^3 \div \left[\frac{1}{4}\right]^{-2} + \left[\frac{-1}{2}\right]^{-3}$

$= \frac{1}{8} \div \frac{1}{16} + \frac{-1}{-8} = \frac{1}{8} \div \frac{1+2}{16}$

$= \frac{1}{8} \div \frac{3}{16} = \frac{1}{8} \times \frac{3}{16} = \frac{3}{128}$

(e) $(3^{-2} \div 2^{-3}) \times 5^{-3} \; \frac{1}{3^2} \div \frac{1}{2^3} \times \frac{1}{5^3}$

$\frac{1}{9} \times \frac{8}{1} \times \frac{1}{125} = \frac{8}{1125}$

(f) $(5^0 + 4^{-1}) \times 2^2 \; (1 + \frac{1}{4}) \times 4 = \frac{5}{4} \times 4 = 5$

5. Evaluate $a^2 + b(b+2)^2$ if $a = 3, b = -2$:

$a^2 + b(b+2)^2 = a^2 + b[b^2 + 4b + 4]$

$= a^2 + b^3 + 4b^2 + 4b$

$= 3^2 + (-2)^3 + 4(-2)^2 + 4(-2)$

$= 9 - 8 + 16 - 8$

$= 9$

6. Evaluate $a(a+b)^3$ if $a = -1/2, b = 2/3$:

$a(a+b)^3 = \frac{-1}{2} \; \frac{-1}{2} + \frac{2}{3}^{\;3}$

$= -\frac{1}{2}\left[\frac{1}{216}\right] = -\frac{1}{432}$

7. Evaluate $(a+b)^2 \div (a-b)^2$ if $a = 3, b = -2$:

$(a+b)^2 \div (a-b)^2$

$= \frac{(3+-2)^2}{(3--2)^2} = \frac{(3-2)^2}{(3+2)^2} = \frac{1^2}{5^2} = \frac{1}{25}$

Exercise – 2.2

1. Write the base and the exponent of the following:

	Base	Exponent
(a)	3	5
(b)	4	-6
(c)	-8/9	-7
(d)	0	4
(e)	2/6	-6
(f)	$\sqrt{}4/3$	-8
(g)	$\sqrt{}5$	0
(h)	$1/\sqrt{}2$	0

2. Write in exponential form:

(a) $3 \times 3 \times 3 \times 3 = 3^4$

(b) $\sqrt{}2 \times \sqrt{}2 \times \sqrt{}2 = (\sqrt{}2)^3$

(c) $\frac{1}{5} \times \frac{1}{5} \times \frac{1}{5} \times \frac{1}{5} = \left[\frac{1}{5}\right]^4$

(d) $\frac{16}{81} = \left[\frac{4}{9}\right]^2$

(e) $\left[\frac{-2}{5}\right] \times \left[\frac{-2}{5}\right] \times \left[\frac{-2}{5}\right] = \left[\frac{-2}{5}\right]^3$

(f) $5^2 \times 5^2 \times 5^2 = (5)^6$

3. Simplify the following and express in exponential form:

(a) $(28)^{-4} = 2^{8x(-4)} = 2^{-32}$

(b) $4^{-6} \times 4^8 \times 4^{-1} = 4^{-6+8-1} = 4 = 2^2$

(c) $\left[\frac{1}{\sqrt{3}}\right]^4 \times \left[\frac{1}{\sqrt{3}}\right]^{-1} \times \left[\frac{1}{\sqrt{3}}\right]^{-3} = \left[\frac{1}{\sqrt{3}}\right]^{4-1-3}$

$= \left[\frac{1}{\sqrt{3}}\right]^0$

(d) $2^{18} \div 2^{16} = 2^{18-16} = 2^2$

(e) $(\sqrt{}6)^{-5} \times (\sqrt{}6)^{-1} \times (\sqrt{}6)^{-7} = (\sqrt{}6)^{-5-1-7}$

$= (\sqrt{}6)^{-13}$

4. Simplify the following by using the laws of exponents:

(a) $x^5 \times x^3 \times x^7 = x^{5+3+7} = x^{15}$

(b) $\frac{100^{-7}}{100^{-6}} = 100^{-7+6} = 100^{-1} = \frac{1}{100}$

(c) $\frac{3^{-5} \times a^{-6} \times b^{-4}}{3^{-6} \times a^{-5} \times b^{-3}} = 3 \times a^{-1} \times b^{-1} = \frac{3}{ab}$

5. Simplify the following:

(a) (a) $3 \times 3 \times 3 \ldots\ldots 10$ times. $= 310$

$= 59049$

(b) $\frac{\sqrt{4}}{7} \times \frac{\sqrt{4}}{7} \times \frac{\sqrt{4}}{7} \times \frac{\sqrt{4}}{7} = \frac{\sqrt{4}^4}{7}$

(c) $\left[-\frac{3}{5}\right]^3 \times \left[-\frac{3}{5}\right]^{10} \times \left[\frac{-3}{5}\right]^5 = \left[-\frac{3}{5}\right]^{18}$

(d) $\left\{\left\{\left[\frac{1}{3}\right]^{-4}\right\}\right]^{1/4} = \left[\frac{1}{3}\right]^{-1} = \frac{1}{3^{-1}} = 3$

(e) $\frac{25 \times a^{-4}}{5^3 \times 10 \times a^{-8}} = \frac{5^2 \times a^{-4}}{5^4 \times 2 \times a^{-8}} = \frac{a^4}{50}$

(f) $\frac{3^{-5} \times 10^{-5} \times 125}{5^{-7} \times 6^{-5}} = \frac{5^7 \times 5^3 \times 6^5}{3^5 \times 10^5}$

$= \frac{5^{10} \times 6^5}{3^5 \times 10^5} = 3125$

6. Find the reciprocal of the following :

(a) $\left[\frac{2}{3}\right]^{-7} \times \left[\frac{1}{3}\right]^7 = \frac{3^7}{2^7} \times \frac{1^7}{3^7} = \frac{1}{2^7} = \frac{1}{128}$

Reciprocal = 128

(b) $\left[\frac{3}{5}\right]^3 \div \left[\frac{6}{7}\right]^3 = \frac{3^3}{5^3} \times \frac{7^3}{6^3} = \frac{1}{2^3} \times \frac{7^3}{5^3}$

$= \frac{343}{1000}$ Reciprocal = $\frac{343}{1000}$

7. Fill in the blanks:

(a) $(2^{-1} \times 7^{-1}) \times \left[-\frac{3}{7}\right]^{-1} = -\frac{1}{6}$

(b) $(7^{-1} + 14^{-1}) \div 14^{-1} = 3$

(c) $(3^7 \div 3^2) \div 3^5 = 1$

Exercise – 2.3

1. Change the given in standard form:

(a) 1.73×10^{-5} (b) 8.848×10^3 m

(c) 7.6×10^{-6} mm (d) 5.036×10^5 kg.

(e) 1.496×10^{11} m. (f) 2.28×10^8 km.

(g) 3.1×10^{-6} (h) 1.0×10^5 light years.

(i) 3.84467×10^8 m. (j) 4.0×10^{-6} mm

(k) 2.53×10^{11} (l) 5.914×10^8

2. Express in usual form:

(a) $5.0 \times 10^{-4} = 0.0005$

(b) $6.7 \times 10^{-7} = 0.00000067$

(c) $7.54 \times 10^{-4} = 0.000754$

(d) $4.61492 \times 10^6 = 4614920$

(e) $1.0003 \times 10^8 = 100030000$

(f) $73.173000 \times 10^{-9} = 000000073173$

(g) $3.5 \times 10^{-5} = 0.000035$

(h) $23.794 \times 10^5 = 2379400$

Revision Exercise

1. Tick (✓) the correct option:

(a) (i) 5 (b) (i) 1

(c) (ii) 4.63×10^8 (d) (i) 0.000706

2. Find the value of:

(a) $6^0 \times 8^0 = 1$

(b) $(x^2)^0 = 1$

(c) $-1^0 + \frac{1}{5} + 6^0 = 1$

(d) $(1^0 + 2^0 + 3^0) \div (x^0 + y^0) = \frac{3}{2}$

3. Express the given below in the power notation:

(a) $\frac{8}{27} = \left[\frac{2}{3}\right]^3$

(b) $\frac{-125}{27} = \left[\frac{-5}{3}\right]^3$

(c) $\frac{216}{343} = \left[\frac{6}{7}\right]^3$

(d) $\frac{-1000}{729} = \left[\frac{-10}{9}\right]^3$

4. Simplify the following:

(a) $\left[\frac{3}{5}\right]^4 \times \left[\frac{3}{5}\right]^5 \div \left[\frac{3}{5}\right]^9 = \left[\frac{3}{5}\right]^{4+5-9} = \left[\frac{3}{5}\right]^0 = 1$

(b) $\left[\frac{1}{3}\right]^{-3} - \left[\frac{1}{2}\right]^{-3} \div \left[\frac{1}{4}\right]^{-2} = 3^3 - 2^3 \div 4^2$

$= 27 - 8 \div 16 = \frac{19}{16}$

(c) $(5^2 + 2^3 - 3^3) \div (4)^{-2} = (25+8-27) \div 4^{-2}$

$= 6 \div \frac{1}{16} = 96$

(d) $(4^{-1} + 8^{-1}) \div \left[\frac{2}{3}\right]^{-2} = \frac{1}{4} + \frac{1}{8} \div \left[\frac{3}{2}\right]^{2}$

$= \frac{3}{8} \times \frac{2}{3} = \frac{1}{4}$

(e) $\left[\frac{-2}{7}\right]^{-4} \times \left[\frac{-7}{3}\right]^{2} = \left[\frac{7}{-2}\right]^{4} \times \left[\frac{-7}{3}\right]^{2}$

$= \frac{7^6}{2^4 \times 3^2} = \frac{117649}{144}$

(f) $(6^{-1} - 8^{-1})^{-1} + (2^{-1} - 3^{-1})^{-1}$

$= \left[\frac{1}{6} - \frac{1}{8}\right]^{-1} + \left[\frac{1}{2} - \frac{1}{3}\right]^{-1} = \left[\frac{1}{24} + \frac{1}{6}\right]^{-1}$

$= 24 + 6 = 30$

5. Convert the following in standard form:

(a) 0.00000315 = 3.15×10^{-6}

(b) 6351.63 = 6.35163×10^{3}

(c) 0.0004056 = 4.056×10^{8}

(d) 836,000,000 = 8.36×10^{8}

(e) 9,000,000,000 = 9.0×10^{9}

(f) 0.00000007 = 7.0×10^{-8}

Chapter – 3 Squares and Square Roots

Exercise – 3.1

1. Evaluate the following:

(a) $5^2 = 25$

(b) $7^2 = 49$

(c) $8^2 = 64$

(d) $13^2 = 169$

(e) $20^2 = 400$

2. State which of the following are not a perfect square by observing their unit's place digit:

a, b, c, e, f, g, h

3. Determine the unit's digit of the following squares:

a) 4 b) 1 c) 1 d) 0

e) 5 f) 1 g) 1 h) 9

4. Determine the number of digits in the squares of the following numbers:

(a) 2 b) 4 c) 7 d) 5

e) 7 f) 8 g) 3 h) 7

5. Evaluate the following:

(a) 81 (b) 121 (c) 169

6. Write the Pythagorean Triplets whose one number is:

(a) 6, 8, 10 (b) 8, 15, 17

(c) 16, 63, 65

7. State which of the following are Pythagorean Triplets:

a) 3, 4, 5 (d) 24, 10, 26

8. Determine the value of the given numbers::

(a) $(-13)^2 = 169$ (b) $(-7)^2 = 49$

(c) $\left[\frac{-7}{3}\right]^2 = \frac{49}{9}$ (d) $\left[\frac{-12}{5}\right]^2 = \frac{144}{25}$

(e) $\left[\frac{19}{-17}\right]^2 = \frac{361}{289}$ (f) $\left[\frac{-9}{2}\right]^2 = \frac{81}{4}$

(g) $(-21)^2 = 441$ (h) $\left[\frac{-25}{14}\right]^2 = \frac{625}{196}$

9. Find the squares of the following numbers:

(a) $\frac{3}{5} = \frac{9}{25}$ (b) $\frac{13}{12} = \frac{169}{144}$

(c) $\frac{1}{6} = \frac{1}{36}$ (d) $\frac{7}{10} = \frac{49}{100}$

(e) $\frac{-9}{7} = \frac{81}{49}$ (f) $\frac{-13}{12} = \frac{169}{144}$

(g) $\frac{11}{7} = \frac{121}{49}$ (h) $\frac{19}{20} = \frac{361}{400}$

10. Observe the following pattern and find the missing digits:

$100001^2 = 10000200001$

Exercise – 3.2

1. a) 14 b) 6 c) 42

2. Find the square root of the following by repeated subtraction method:

a) 16

16 – 1 = 15

15 – 3 = 12

12 – 5 = 7

7 – 7 = 0

No. of steps of subtraction is 4.

$\sqrt{16} = 4$

b) 64

64 – 1 = 63

63 – 3 = 60

60 – 5 = 55
55 – 7 = 48
48 – 9 = 39
39 – 11 = 28
28 – 13 = 15
15 – 15 = 0

No. of steps of subtraction is 8.

$\sqrt{64} = 8$

c) 81

81 – 1 = 80
80 – 3 = 77
77 – 5 = 72
72 – 7 = 65
65 – 9 = 56
56 – 11 = 45
45 – 13 = 32
32 – 15 = 17
17 – 17 = 0

No. of steps of subtraction is 9.

$\sqrt{81} = 9$

d) 169

169 – 1 = 168
168 – 3 = 165
165 – 5 = 160
160 – 7 = 153
153 – 9 = 144
144 – 11 = 133
133 – 13 = 120
120 – 15 = 105
105 – 17 = 188
88 – 19 = 69
69 – 21 = 48
48 – 23 = 25
25 – 25 = 0

No. of steps of subtraction is 13.

$\sqrt{169} = 13$

3. Find the square root of the following by prime factorization method:

a) $\sqrt{400} = \sqrt{2 \times 2 \times 2 \times 2 \times 5 \times 5}$
$= 2 \times 2 \times 5$
$= 20$

b) $\sqrt{676} = \sqrt{2 \times 2 \times 13 \times 13}$
$= 2 \times 13$
$= 26$

c) $\sqrt{841} = \sqrt{29 \times 29}$

d) $\sqrt{2025} = \sqrt{5 \times 5 \times 3 \times 3 \times 3 \times 3}$
$= 5 \times 3 \times 3$
$= 45$

4. Find the square root of the following rational numbers:

a) $\frac{\sqrt{16}}{\sqrt{36}} = \frac{4}{6}$ b) $\frac{\sqrt{49}}{\sqrt{81}} = \frac{7}{9}$

c) $\frac{\sqrt{1156}}{\sqrt{900}} = \frac{34}{30}$ d) $\frac{\sqrt{1600}}{\sqrt{2025}} = \frac{40}{45}$

5. Determine the number of digits in the square roots of the following numbers:

a) 2 b) 3 c) 2 d) 3

6. Find the square root of the following numbers by short method:

a) $\sqrt{256} = 16^2 = 256$
$\sqrt{256} = 16$

b) $\sqrt{1024} = 32^2 = 1024$
$\sqrt{1024} = 32$

c) $\sqrt{4900} = 70^2 = 4900$
$\sqrt{4900} = 70$

d) $\sqrt{529} = 23^2 = 529$
$\sqrt{529} = 23$

7. Simplify the following:

(a) $\sqrt{x^4y^6} = x^2y^2$

(b) $\sqrt{p^2q^2} = pq$

(c) $\sqrt{2^8 \times 3^2} = 2^4 \times 3 = 16 \times 3 = 48$

(d) $\frac{\sqrt{5}^6}{\sqrt{10}^2} = \frac{5^3}{10} = \frac{125}{10}$

8. Find the smallest number by which the following numbers should be multiplied to get perfect square number. Also find the square root of the square number so obtained:

(a) $75 = 5 \times 5 \times 3$
= (It is not perfect square)
$= 5 \times 5 \times 3 \times 3$

= (225 is a perfect square)

= $\sqrt{225} = 5 \times 3 = 15$

(b) 408 = $\underline{2 \times 2} \times \underline{2 \times 2} \times 13$

= (It is not perfect square)

= $\underline{2 \times 2} \times \underline{2 \times 2} \times \underline{13 \times 13}$

= (2704 is perfect square)

= $\sqrt{2704} = \underline{2 \times 2} \times 13 = 52$

(c) 15680 = $\underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times 5 \times \underline{7 \times 7}$

= (It is not perfect square)

= $\underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{5 \times 5} \times \underline{7 \times 7}$

= (78400 is perfect square)

= $\sqrt{78400} = \underline{2 \times 2} \times 2 \times 5 \times 7 = 280$

(d) 768 = $\underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times 3$

= (It is not perfect square)

= $\underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{3 \times 3}$

= (2304 is perfect square)

= $\sqrt{2304} = \underline{2 \times 2} \times \underline{2 \times 2} \times 3 = 48$

9. Find smallest number by which following numbers should be divided to get perfect square number. Also find square root of square number so obtained:

(a) 75 = $5 \times 5 \times 3$

= (3 does not have a pair)

= 5×5 = (75 must be divided by 3)

= 25 = (25 is a perfect square)

$\therefore \sqrt{25} = 5$

(b) 396 = $2 \times 2 \times 3 \times 3 \times 11$

= (11 does not have a pair)

= $2 \times 2 \times 3 \times 3$

= (396 must be ÷ by 11)

$\therefore$ 2 x 3 = 6

(c) 360 = $2 \times 2 \times 2 \times 3 \times 3 \times 5$

= (2, 5 do not have a pair)

= $2 \times 2 \times 3 \times 3$

= (360 must be ÷ by 2,5)

= 2 x 3 = 6

$\therefore$ 2 x 5 = 10

(d) 19208 = $2 \times 2 \times 2 \times 7 \times 7 \times 7 \times 7$

= (2 does not have a pair)

= $2 \times 2 \times 7 \times 7 \times 7 \times 7$

= (19208 must be ÷ by 2)

= $2 \times 7 \times 7$ = 98

$\therefore$ 2 = 2

10. Simplify:

a) $\sqrt{32.49} + \sqrt{0.3136} = 5.7 + 0.56$

= 6.26

b) $\sqrt{0.09} + \sqrt{0.0009} = 0.30 + 0.03$

= 0.33

c) $\sqrt{400} + \sqrt{0.04} + \sqrt{0.0009}$

= 20+0.2 + 0.03 = 20.23

d) $\sqrt{2.56} + \sqrt{0.2025} = 1.6 + 0.45$

= 2.05

Exercise – 3.3

1. Find square root of numbers given below by division method:

a) $\sqrt{900}$

	30
3	900
	9
60	00
	00
	0

$\sqrt{900} = 30$

(b) $\sqrt{1296}$

	3 6
3	1296
	9
96	396
	396
	0

$\sqrt{1296} = 36$

(c) $\sqrt{1764}$

	4 2
4	1764
	16
82	164
	164
	0

$\sqrt{1764} = 42$

(d) $\sqrt{}$ 26015

	5 1
5	2601
	25
101	101
	101
	0

$\sqrt{}$ 2601 = 51

2. Find the number of digits in the square foot of the following digits (with actual calculation):

a) 3 b) 3 c) 2 d) 3

2. Find the square root of the following numbers:

a) $\sqrt{}$ 79.21

	8 9
8	79.21
	64
169	1521
	1521
	0

$\sqrt{}$ 2601 = 51

b) $\sqrt{}$ 62.2521

	7. 8 9
7	62.2521
	49
148	1325
	1184
1489	14121
	13401
	720

$\sqrt{}$ 62.2521 = 7.89

c) $\sqrt{}$ 0.8281

	0. 9 1
9	0.8281
	81
91	181
	91
	90

$\sqrt{}$ 0.8281 = 0.91

d) $\sqrt{}$ 552.25

	2 3. 5
2	552.25
	4
43	152
	129
435	2325
	2175
	150

$\sqrt{}$ 552.25 = 23.5

4. Find smallest number which must be added to each of following given numbers to get their perfect square. Find square root of new numbers so obtained:

a) 1000 = 31^2 = 961
= 32^2 = 1024
= 24 must be added to 1000 to get perfect square.
= 32 is square root of new number 1024.

b) 630 = 25^2 = 625
= 26^2 = 676
= 46 must be added to 630 to get perfect square.
= 26 is square root of new number 676.

c) 326954 = 571^2 = 326041
= 572^2 = 327184
= 230 must be added to 326954 to get perfect square.
= 572 is square root of new number 327184.

d) 1750 = 41^2 = 1681
= 42^2 = 1764
= 14 must be added to 1750 to get perfect square.
= 42 is square root of new number 1764.

e) 26800 = 163^2 = 26569
= 164^2 = 26896
= 96 must be added to 26800 to get perfect square.
= 164 is square root of new number 26896.

f) 4000 = 63^2 = 3969
= 64^2 = 4096

= 96 must be added to 4000 to get perfect square.

= 64 is square root of new number 4096.

g) 70041 = 264^2 = 69696

= 265^2 = 70225

= 184 must be added to 70041to get perfect square.

= 265 is square root of new number 70225.

h) 54280 = 232^2 = 53824

= 233^2 = 54289

= 9 must be added to 54280 to get perfect square.

= 233 is square root of new number 54289.

2. Find least number which must be subtracted to each of following given numbers to get their perfect square. Find square root of new numbers so obtained also:

(a) 1000= 31^2 = 961

= 39 be subtracted from 1000 to get perfect square.

= 31 is square root of new number 961.

(b) 3250= 57^2 = 3249

= 1 be subtracted from 3250 to get perfect square.

= 57 is square root of new number 3249.

(c) 23914 = 154^2 = 23716

= 39 be subtracted from 23914 to get perfect square.

= 154 is square root of new number 23716.

(d) 99,999 = 316^2 = 99856

= 143 be subtracted from 99,999 for perfect square.

= 316 is square root of new number 99856.

(e) 1989= 44^2 = 1936

= 53 be subtracted from 1989 to get perfect square.

= 44 is square root of new number 1936.

(f) 73451 = 271^2 = 73441

= 10 be subtracted from 73451 for perfect square.

= 271 is square root of new number 73441.

(g) 70041 = 264^2 = 69696

= 39 be subtracted from 70041to get perfect square.

= 264 is square root of new number 69696.

(h) 665674 = 815^2 = 664225

= 39 be subtracted from 3250 to get perfect square.

= 815 is square root of new number 664225.

3. Find the square root of the following numbers correct to two decimal places:

a) $\sqrt{283}$

	16.82
16	283 256
328	2700 2624
3362	7600 6724
	876

$\sqrt{283} = 16.82$

b) $\sqrt{6154}$

	78.44
7	6154 49
148	1254 1184
1564	7000 6256
15684	74400 62736
	11664

$\sqrt{6154} = 78.44$

c) $\sqrt{}$ 353.79

	18.80
1	353.79
	1
28	253
	224
368	2979
	2944
3676	3500

$\sqrt{}$ 353.79 = 18.80

d) $\sqrt{}$ 789

	28.01
2	789
	4
48	389
	384
481	500
	481
	19

$\sqrt{}$ 789 = 28.01

e) $\sqrt{}$ 2347

	48.44
4	2347
	16
88	747
	704
964	4300
	3856
9684	44400
	38736
	5664

$\sqrt{}$ 2347 = 48.44

f) $\sqrt{}$ 35.793

	5.98
5	35.793
	25
109	1079
	981
1188	9830
	9504
	326

$\sqrt{}$ 35.793 = 5.98

g) $\sqrt{}$ 5555

	74.53
7	5555
	49
144	655
	576
1485	7900
	7425
14903	47500
	44709
	2791

$\sqrt{}$ 5555 = 74.53

h) $\sqrt{}$ 90031

	300.05
3	90031
	9
605	3100
	3025
	75

$\sqrt{}$ 90031 = 300.05

7. Find the least number of 6 digit which is perfect square:

Least 6 digit number = 100,000

Least 6 digit no. being a perfect square = 100489

3172 = 100489

8. What must be added to 600 to make it a perfect square?

252 = 625

$\therefore$ 25 must be added to 600 to make it a perfect square.

9. Find greatest number of 4 digit which is a perfect square:

Greatest 4 digit number = 9999

Greatest 4 digit no. being a perfect square = 9801

992 = 9801

4. If $\sqrt{}$ 625 = 25, find $\sqrt{}$ 0.0625 + $\sqrt{}$ 0.000625

$\sqrt{}$ 0.0625 = 0.25

$\sqrt{}$ 0.000625 = (+) 0.025

0.275

11. There are 2025 oranges in a basket to be distributed among children. Each child will get as many oranges as there are children. How many oranges will each child get?

Total oranges in the basket = 2025

Each child will get oranges = $\sqrt{2025} = \sqrt{452}$

= 45 oranges

12. A commander arranges his soldiers in a row so that number of column is equal to number of rows. In that process, 25 soldiers are left out. If total number of soldiers are 650. Find number of soldiers in each row:

Total soldiers = 650

Soldiers left out = 25

Balance soldiers = 625 (650 – 25)

Soldiers in each row = $\sqrt{625}$

= 25 soldiers

13. The length of a rectangle is twice is breadth and its area is 288 cm. Find length and breadth of rectangle:

Let breadth be = a

$\therefore$ Length is = 2a

Area of rectangle = $l \times b$ = $288\ cm^2$

= $2a \times a$ = $288\ cm^2$

= $2a^2$ = $288\ cm^2$

= a^2 = 144

= a = $\sqrt{144}$ = $\sqrt{122}$

= a = 12 cm

$\therefore$ Breadth = a = 12 cm

Length = 2a = 2 × 12 = 24 cm

14. What must be added to 23471 to make it a perfect square? Also find square? Also find square root of number so obtained.

23471 = 1532 = 23409

= 1542 = 23716

= 245 must be added to 23471 for perfect square.

= 154 is square root of new number 23716.

Revision Exercise

1. Tick (✓) the correct option:

(a) (iii) Both (b) (ii) 1.2

(c) (i) 2 x 3 x 9

2. Find square root of following numbers by prime factorization method:

(a) $\sqrt{56644} = \sqrt{2 \times 2 \times 7 \times 7 \times 17 \times 17}$

= $2 \times 7 \times 17$

= 238

(b) $\sqrt{2116} = \sqrt{2 \times 2 \times 23 \times 23}$

= 2×23

= 46

(c) $\sqrt{321489}$

= $\sqrt{3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 7 \times 7}$

= $3 \times 3 \times 3 \times 37$

= 567

3. Find square root of given numbers by division method:

(a) $\sqrt{3136}$

	5 6
5	3136
	25
106	636
	636
	0

$\sqrt{3136} = 56$

(b) $\sqrt{59.29}$

	7. 7
7	59.29
	49
147	1029
	1029
	0

$\sqrt{59.29} = 7.7$

(c) $\sqrt{670.2921}$

	25.88
2	670.29
	4
45	270
	225
508	4529
	4064
5168	46500
	41344
	5156

$\sqrt{670.2921} = 25.88$

4. Evaluate:

(a) $\sqrt{156.25} + \sqrt{1.5625}$

$= \sqrt{(12.5)2} + \sqrt{(1.25)2}$

$= 12.5 + 1.25$

$= 13.75$

(b) $\sqrt{0.7225} + \sqrt{72.25}$

$= \sqrt{(0.85)2} + \sqrt{(8.5)2}$

$= 0.85 + 8.5$

$= 9.35$

5. Find the square root of upto 3 decimal places:

$\frac{5}{7} = 0.714$

6. Find the smallest square number which is divisible by 8, 12, 15, and 20:

2	8, 12, 15, 20
2	4, 6, 15, 10
2	2, 3, 15, 5
3	1, 3, 15, 5
5	1, 1, 5, 5
	1, 1, 1, 1

LCM of 8, 12, 15, 20 = $2 \times 2 \times 2 \times 3 \times 5 = 120$.

Last prime factors 2, 3, 5 are not paired.

$\therefore$ 120 is not a perfect square.

To get a perfect square, we need to make pairs of prime factors of 2, 3, 5.

$\therefore$ Required number = $120 \times 2 \times 3 \times 5$

$= 3600$

7. What should be added to 1050 to make it a perfect square?

1050 = 332 = 1089

= 39 must be added to 1050 to get a perfect square.

8. The product of two numbers is 1296. If one of the numbers is 16 times the other, Find the numbers?

Let 1st number be = a

The 2nd number is = 16a

Product of two numbers = $a \times 16a$

$= 16a^2 = 1296$

$a^2 = 81$

$a = \sqrt{81}$

$a = 9$

1st number = a = 9

2nd number = 16a = $16 \times 9 = 144$

9. Find the square root of $\sqrt{1296}$ and hence evaluate:

$\sqrt{0.1296} + \sqrt{12.96}$

$\sqrt{1296} - \sqrt{0.1296}$

Square root of $\sqrt{1296} = \sqrt{(36)^2} = 36$

$\sqrt{0.1296} + \sqrt{12.96}$

$= \sqrt{(0.36)^2} + \sqrt{(3.6)^2}$

$\sqrt{1296} - \sqrt{0.1296}$

$= \sqrt{(36)^2} + \sqrt{(0.36)^2}$

$= 0.36 + 3.6$

$36 + 0.36$

$= \frac{3.96}{36.36} = 0.11$

10. Find whether 75 is a perfect square or not?

$75 = 3 \times 5 \times 5$

There is no pair of 3.

$\therefore$ 75 is not a perfect square.

11. Find the greatest 5 digit number which is perfect square:

99999

Greatest 5 digit number = 99999

Greatest 5 digit no. being a perfect square

= 99856

$316^2 =$ 99856

12. Find the value of the following:

(a) $15^2 - 14^2 = 15 + 14 = 29$

(b) $42^2 - 41^2 = 42 + 41 = 83$

(c) $100^2 - 99^2 = 100 + 99 = 199$

(d) $201^2 - 200^2 = 201 + 200 = 401$

Chapter – 4 Cubes and Cube Roots

Exercise – 4.1

1. Find cube of following:

a) $14^3 = 2744$

b) $21^3 = 9261$

c) $36^3 = 46656$

d) $18^3 = 5832$

e) $43^3 = 79507$

f) $25^3 = 15625$

g) $22^3 = 10648$

h) $81^3 = 531441$

2. Find cube root of following numbers by prime factorization method:

a) $\frac{27}{64} = \frac{(3)^3}{(4)^3} = \frac{3}{4}$

b) $1728 = (12)^3 = 12$

c) $64 \times 1331 = (4)^3 \times (11)^3 = 4 \times 11$
$= 44$

d) $2.197 = (1.3)^3 = 1.3$

e) $-216 = (-6)^3 = -6$

f) $-1331 = (-11)^3 = -11$

g) $343 = (7)^3 = 7$

h) $\frac{-64}{343} = \frac{(-4)^3}{(7)^3} = \frac{-4}{7}$

i) $\frac{729}{1000} = \frac{(9)^3}{(10)^3} = \frac{9}{10}$

j) $4096 = (16)^3 = 16$

k) $3.375 = (1.5)^3 = 1.5$

l) $-\frac{512}{343} = \frac{(-8)^3}{(7)^3} = \frac{-8}{7}$

3. Find cube of following numbers:

a) $16^3 = 4096$

b) $(-7.9)^3 = -493.039$

c) $\left[-\frac{1}{2}\right]^3 = \frac{-1}{8}$

d) $(0.1)^3 = 0.001$

e) $(0.3)^3 = 0.027$

f) $\left[-\frac{3}{7}\right]^3 = \frac{-27}{343}$

g) $\left[-\frac{13}{19}\right]^3 = \frac{-2197}{6859}$

h) $(39)^3 = 59319$
Take **1**: $(1^3 < 2^3)$ (or $1 < 2 < 8$).

4. Find the cube root of the following numbers by estimation:

a) 2197 :
1st group = 197 : 7 is unit place of cube 3.
2nd group = 2 : Take 1: $(1^3 < 2^3)$ (or $1 < 2 < 8$).
$\sqrt[3]{2197} = 13$.

b) 15625 :
1st group = 625 : 5 is unit place of cube 5.
2nd group = 15 : Take 2: $(2^3 < 3^3)$ (or $8 < 15 < 27$).
$\sqrt[3]{15625} = 25$.

c) 21952 :
1st group = 952 : 2 is unit place of cube 8.
2nd group = 21 : Take 2: $(2^3 < 3^3)$ (or $8 < 21 < 27$).
$\sqrt[3]{21952} = 28$.

d) 175616 :
1st group = 616 : 6 is unit place of cube 6.
2nd group = 175 : Take 5: $(5^3 < 6^3)$ (or $125 < 175 < 216$).
$\sqrt[3]{175616} = 56$.

e) 74088 :
1st group = 088 : 8 is unit place of cube 2.
2nd group = 74 : Take 4: $(4^3 < 5^3)$ (or $64 < 74 < 125$).
$\sqrt[3]{74088} = 42$.

f) 35937 :
1st group = 937 : 7 is unit place of cube 3.
2nd group = 35 : Take 3: $(3^3 < 4^3)$ (or $27 < 35 < 64$).
$\sqrt[3]{35937} = 33$.

5. The volume of a cube is 27000 cm3. Find its side:

Volume of cube = $27000\ cm^3$.

Side of cube = $\sqrt[3]{27000}$
$= \sqrt[3]{(30)^3} = 30$ cm.

3. Find smallest number which divides 10368 to make it a perfect cube. Find cube root of new number so obtained:

$10368 = 2\times2\times2 \times 2\times2\times2 \times 2 \times 3\times3\times3 \times 3$
(2, 3 don't have a pair)

= 2×2×2×2×2×2 ×3×3×3 (10368 to be ÷ by 2×3=6)

= 2 × 2 × 3 = 12

6, 12

7. Find smallest number which must be multiplied with 21296 to make it a perfect cube. Find cube root of new number so obtained:

21296 = 2×2×2×2×11×11×11

(2 doesn't have a pair)

= 2×2×2 × 11×11×11 (21296 to be × by 2×2=4)

= 2×2×11 = 44 **Ans:** 4, 44

8. Three numbers are in the ratio 3:5:7. The sum of their cubes is 495. Find the numbers:

Let 1st number be = 3a

The 2nd number is = 5a

The 3rd number is = 7a

Sum of 3 numbers = 3a+5a+7a = 15a

Cube of sum of 3 nos. = $(15a)^3$

= $3375a^3$ $16a^2$ = 1296

a^2 = 81

a = $\sqrt{81}$

a = 9

1st number = a = 9

2nd number = 16a = 16×9 = 144

6. Find the smallest number by which 7200 is multiplied with to make it a perfect cube. Also, Find the cube root of the product so obtained:

7200 = 2×2×2×2×2×3×3×5×5

(2,3,5 don't have cube pair)

= 2×2×2 × 11×11×11 (7200 to be × by 2×3×5=30)

= 2×3×5 = 30

= 7200×30 = 21600 = $(60)^3$

= $\sqrt[3]{21600}$ = $\sqrt[3]{(60)^3}$ = 60

Ans: 30, 60

10. Find the cube root of 226981 and 5832 by estimation:

(i) 226981 :

1st group = 981 : 1 is unit place of cube 1.

2nd group = 226 : Take 6: (63 < 73) (or 216<226<343).

$\sqrt[3]{226981}$=61.

(ii) 5832:

1st group = 832 : 2 is unit place of cube 8.

2nd group = 5 : Take 1: (13 < 23) (or 1 <5<8).

$\sqrt[3]{5832}$=18.

Revision Exercise

1. Tick (✓) the correct option:

a) (iii) a^3 b) (ii) 4

c) (ii) 27 d) (iii) 108

2. Find cube of following numbers:

a) $(1.6)^3$ = 4.096

b) $(13)^3$ = 2197

c) 15^3 = 3375

d) $\left[\frac{3}{5}\right]^3$ = $\frac{27}{125}$

e) $(21)^3$ = 9261

f) $\left[\frac{8}{17}\right]^3$ = $\frac{512}{4913}$

g) $(9)^3$ = 729

h) $\left[\frac{26}{31}\right]^3$ = $\frac{17576}{29791}$

3. Write cubes of all natural numbers 1 to 10 and verify following statements:

1	2	3	4	5	6	7	8	9	10
1	8	27	64	125	216	343	512	729	1000

a) True b) True

4. Evaluate the following:

a) $\sqrt[3]{0.1\times0.1\times0.1\times2\times2\times2} = \sqrt[3]{(0.1)^3\times(2)^3}$

= 0.1×2

= 0.2

b) $\frac{\sqrt[3]{0.027}}{\sqrt[3]{0.008}} = \frac{\sqrt[3]{0.09}}{\sqrt[3]{0.04}} = \frac{\sqrt[3]{(0.3)^3}}{\sqrt[3]{(0.2)^3}}$

$= \frac{\sqrt[3]{(\sqrt{0.3})^3}}{\sqrt[3]{(\sqrt{0.2})^3}} = \frac{0.3}{0.2} = \frac{\sqrt{0.3}}{\sqrt{0.2)}}$

5. Find value of $\sqrt[3]{0.000001}$:

$\sqrt[3]{0.000001}$ = $\sqrt[3]{(0.01)3}$ = 0.01

6. The volume of cube is 32.768 cm^3. Find its side.

Volume of cube = 32.768 cm^3.

Side of cube = $\sqrt[3]{32.768}$

= $\sqrt[3]{(3.2)^3}$

= 3.2 cm.

7. Complete the following table:

	Number	Cube
a.	1	1
b.	2	8
c.	3	27
d.	4	64
e.	5	125
f.	6	216
g.	7	343
h.	8	512
i.	9	729
j.	10	1000

Chapter – 5 Numbers

Exercise – 5.1

1. What does * stand for in?:

a) + b) x c) ÷ d) –

2. Fill 2-digit prime numbers in the blank squares so that the sum of the numbers in both the horizontal and vertical squares is 161:

		41		
		53		
13	**23**	17	**61**	**47**
		31		
		19		

3. Do it yourself.

2. If * and – are two operations such that a* b = a × b + 2 and a ~ b = a + b – 1, find the {(3*3)*3}-3.

Ans: 37

Exercise – 5.2

1. Write the following numbers in the usual form:

a) $9.3 \times 10^5 = 930000$

b) $3.6 \times 10^{-11} = 0.000000000036$

c) $1.03 \times 10^8 = 103000000$

d) $4.2 \times 13^{-11} = 0.00000000000042$

e) $2.07 \times 10^{14} = 207000000000000$

f) $6.0005 \times 10^8 = 60050000$

2. The distance travelled by a ray of light in one year is 94605000000000 metre. Express it in the standard notation:

9.4605 × 1013

3. Write following numbers using standard notation:

a) $0.7 = 7 \times 10^{-1}$

b) $0.0074 = 7.4 \times 10^{-3}$

c) $2400 = 2.4 \times 10^3$

d) $390000 = 3.9 \times 10^5$

e) $0.00000050 = 5.0 \times 10^{-7}$

Exercise – 5.3

1. A 2-digit number has 3 for its ones digit and sum of digits is 1/7 of number itself. What is number?

Let a + b = c

$a + 3 = \frac{1}{7}$ of $(a+3)$

$7a + 21 = a + 3$

$6a = 18$

$a = 3$

Sum of a + b = 6

Tens digit = 6

Ones digit = 3

Sum of digits = 9 (6+3)

9 is 1/7th of = 63

So, Number is = 63

2. A 2-digit number exceeds the sum of the digits of the number by 18 when interchanged. If the digit at ones place is double the digit at tens place, find the number?

Let 2-digit no. be = $10x + y$

On interchanging = $10y + x = 18$

$= 10y + x - (x + y) = 18$

$= 10y + x - x - y = 18$

$= 9y = 18$

$= y = 2$

$= x = 1$

Number = 12

3. A 2-digit number becomes five-sixth of itself when its digits are reversed. The two digits differ by one. Find the number?

Let number be = $10x + y$

On reversing = $10y + x$

As per question = $10y + x = \frac{5}{6}(10x + y)$

$= y/x = 4/5$

$= i.e.\ x = 5$

$y = 4$

So, number = 54

4. The difference between a 2-digit number and the number obtained by interchanging positions of the digit is 63. Find the difference between two digits of that number:

Let number be = $10x + y$

On interchanging = $10y + x$

As per question = $10x + y - (10y + x) = 63$

$= 9(x - y) = 63$

$= (x - y) = \frac{63}{9}$

$= (x - y) = 7$

Exercise – 5.4

1. Which of the following numbers are divisible by 2?

a) 132 (c) 560

2. Which of the following numbers are divisible both by 3 and 9?

a) 81 (b) 243 (d) 657

3. Which of the following numbers are divisible by 5?

(a) 8210

4. Which of the following numbers are divisible by 10?

(b) 280 (d) 510

5. Complete the following table:

Number		Divisible by 2	Divisible by 3	Divisible by 5	Divisible by 10
a.	118	yes			
b.	135		yes	yes	
c.	336	yes	yes		
d.	714	yes	yes		
e.	1045			yes	
f.	1400	yes		yes	yes
g.	1242	yes	yes		
h.	1050	yes	yes	yes	yes
i.	4055		yes	yes	

Revision Exercise

1. Insert the symbols +, -, x, and parenthesis in the following sequence of numbers so that the expressions equals 100:

$1 + (2 \times 3) - 4 + (56 \div 7) + 89$

2. Find the value of unknown:

a)
$$\begin{array}{r} AB \\ \times\ 6 \\ \hline BBB \end{array} = \begin{array}{r} 74 \\ \times\ 6 \\ \hline 444 \end{array}$$

b)
$$\begin{array}{r} 4A \\ +98 \\ \hline CB3 \end{array} = \begin{array}{r} 45 \\ +98 \\ \hline 143 \end{array}$$

c)
$$\begin{array}{r} AB \\ \times\ 5 \\ \hline CAB \end{array} = \begin{array}{r} 50 \\ \times\ 5 \\ \hline 250 \end{array}$$

d)
$$\begin{array}{r} 2AB \\ +A\,B\,1 \\ \hline B\,1\,8 \end{array} = \begin{array}{r} 217 \\ +101 \\ \hline 518 \end{array}$$

3. In the given grid, fill up numbers from 2 to 9. :

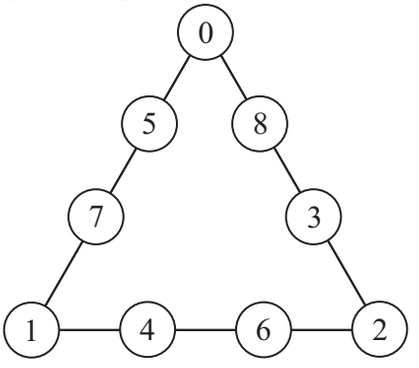
9	**4**			36
5			**7**	35
	8	**3**		24
		6	**2**	12
45	32	18	14	

4. Which of following numbers are divisible by13?

52, 65, 91, 195, 546

5. Do it yourself

3. In following triangle, fill in the numbers from 0 to 8 in the 9 circles so that numbers on each side of triangle add up to 13:



6. Find digits x and y (x>y) such that five-digit number 19x19y is divisible by 36:

Take x = 6
Y = 2
(x > y)

Chapter–6 Algebraic Expressions and Identities

Exercise–6.1

1. Find out the degree of the polynomials given below:

a) $6x^3+3x^2+7x+5$: Degree = 3
b) $6x^2-5x^4-2x^3+3x-3$: Degree = 4
c) $6x+x^5y^2+xy^3+2$: Degree = 7
d) $0x^6+9x^2y+y^4$: Degree = 4
e) $5a^3+a^2b+a^3$: Degree = 3
f) $9a^2b+7a^4+5$: Degree = 4

2. Identify the like terms:

(i) $(4x^2y, -3x^2y, -7x^2y$
(ii) (3xyz, 4xyz, 3xyz)
(iii) (-7ab, 4ab)
(iv) (4xy, -2xy, 3xy, 3xy)
(v) $(8y^2x)$
(vi) (3abc, abc)

3. Which of the given below expressions are polynomials?

(a) $7x^3+4x^2-3x-1$
(f) $44x^3+7$
(g) $9x^3+3x^2+8$

4. Determine which of the expressions in Q.3 are:

a) Binomial : None
b) Monomial : $44x^3+7$
c) Trinomial : $9x^3+3x^2+8$
d) Polynomial : $7x^3+4x^2-3x-1$
e) Non-polynomial : $6x-4+3x^2+7x-6, 6x^7+3a^5-4x-3+1, 2x^4+7x^3+2x^{1/2}-1, 33x^{10}7x^4-3x^5-2x^{-9}+3, 23x+3x^2+3x$

5. Add the given polynomial:

a)
$$\begin{array}{r} x^3-6x^2y+3xy+y^2 \\ +\ 4x^3+5x^2y+3xy-y^2 \\ +\ \underline{\qquad\qquad -4xy+2y^2} \\ 5x^3-x^2y+2xy+2y^2 \end{array}$$

b)
$$\begin{array}{r} -x^2-x+4 \\ x^3+x^2 \\ \qquad -5x+5 \\ 5x^2-7x+6 \\ \underline{\qquad\quad 6x-7} \\ x^3+5x^2-7x+8 \end{array}$$

c)
$$\begin{array}{r} +\ 9x^3+4x^2+x+y \\ \underline{3x^4-10x^3-7x^2\qquad\quad +3} \\ 3x^4-x^3-3x^2+x+y+3 \end{array}$$

d)
$$\begin{array}{r} 7xy+5yz-3zx \\ -4yz+9zx+5y \\ \underline{-2xy\qquad\quad +5x} \\ 5xy+yz+6zx+5x+5y \end{array}$$

e)
$$\begin{array}{r} a+2b+3c-4d \\ -a+3c+4d \\ \underline{-2b+3c-7d} \\ 9c-7d \end{array}$$

6. Subtract the first polynomial from the second:

a)
$$\begin{array}{r} -6x^2y \\ -9x^2y \\ + \\ \hline 3x^2y \end{array}$$

b)
$$\begin{array}{r} a+2b+3c-7d \\ -3a-7c+4d \\ +\quad +\quad - \\ \hline 4a+2b+10c-11d \end{array}$$

c)
$$\begin{array}{r} 4a^2-7a-3 \\ 3a^2+6a-4 \\ -\ -\ + \\ \hline a^2-13a+1 \end{array}$$

d)
$$\begin{array}{r} 3x^2-8y^2-2x^2y+7xy^2 \\ -5x^2+7y^2+5x^2y-8xy^2 \\ +\quad -\quad -\quad + \\ \hline 8x^2-15y^2-7x^2y+15xy^2 \end{array}$$

7. Find perimeter of a triangle having sides (4x + 3y + 7) m, (8x + 3) m and (3y + 7) m:

Perimeter of triangle is:

$$\begin{array}{r} 4x+3y+7\ m \\ +\ 8x+3\ m \\ \underline{+\quad 3y+7\ m} \\ 12x+6y+17\ m \end{array}$$

8. Find perimeter of square with side (3xy + 7x)m.

Side of Square = (3xy + 7x) m

Perimeter of Square = 4(3xy + 7x) m

= 12xy + 28x m

2. Find perimeter of rectangle having sides (3x + 2y) cm and (7y) cm:

Sides of Rectangle = (3x + 2y) cm & (7y) cm

Perimeter of Rectangle = 2 [(3xy + 2y) + (7y)] cm

= 2 [3xy + 9y] cm

= (6xy + 18y) cm

3. By how much is $6x^3 + 6x^2 + 5x + 9$ greater than $5x^3 - 10x^2 + 3$?

$$\begin{array}{r} 6x^3 + 6x^2 + 5x + 9 \\ 5x^3 - 10x^2 + 3 \\ - \quad + \quad - \\ \hline x^3 + 16x^2 + 5x + 6 \end{array}$$

So, $6x^3 + 6x^2 + 5x + 9$ is greater by $(x^3 + 16x^2 + 5x + 6)$ than $5x^3 - 10x^2 + 3$.

11. By how much is $6x^2 + 3x - 2$ smaller than $6x^2 - 10x$?

$$\begin{array}{r} 6x^2 - 10x \\ 6x^2 + 3x - 2 \\ - \quad - \quad + \\ \hline -13x + 2 \end{array}$$

So, $6x^2 + 3x - 2$ is smaller by $(-13x + 2)$ than $6x^2 - 10x$.

12. What should be added to $7x + 3y + 9x^2 + 10x^2y$ to get $10x^2 + 3y + x - 14yx^2$?

$$\begin{array}{r} 10x^2 + x + 3y - 14yx^2 \\ 9x^2 + 7x + 3y + 10x^2y \\ - \quad - \quad - \quad - \\ \hline x^2 - 6x - 24x^2y \end{array}$$

So, $(x^2 - 6x - 24x^2y)$ be added to $7x + 3y + 9x^2 + 10x^2y$ to get $10x^2 + 3y + x - 14yx^2$.

13. What should be subtracted from $4ab + 3a^2 - 7a + 2$ to obtain $4a^2 - 5 + 9a - 3ab$?

$$\begin{array}{r} 3a^2 + 4ab - 7a + 2 \\ 4a^2 - 3ab + 9a - 5 \\ - \quad + \quad - \quad + \\ \hline -a^2 + 7ab - 16a + 7 \end{array}$$

So, $(-a^2 + 7ab - 16a + 7)$ should be subtracted from $4ab + 3a^2 - 7a + 2$ to get $4a^2 - 5 + 9a - 3ab$.

14. A person bought a pen for Rs. (4x + 7) and a pencil for Rs. $(5x^2 + 7x - 3)$. He gave Rs. $(2x^2 + 3x - 5)$ to the shopkeeper. How much money did he get back?

Cost of pen	:	Rs.	$4x + 7$
Cost of pencil	:	Rs.	$5x^2 + 7x - 3$
Total cost	:	Rs.	$5x^2 + 11x + 4$
He paid	:	Rs.	$2x^3 + 3x - 5$
Less: Total cost	:	Rs.	$+ 5x^2 + 11x + 4$
			$- \quad - \quad -$
He got back	:	Rs.	$2x^3 - 5x^2 - 8x - 9$

Exercise – 6.2

1. Find following products:

a) $(y + 2)(y + 9) = y^2 + 9y + 2y + 18$

$= y^2 + 11y + 18$

b) $(x + 8)(x + 3) = x^2 + 3x + 8x + 24$

$= x^2 + 11x + 24$

c) $(a + 3b)(a^2 - 3ab + 9b^2)$

$= a^3 - 3a^2b + 9ab^2 + 3a^2b - 9ab^2 + 27b^3$

$= a^3 + 27b^3$

d) $(1 - x)(1 + x + x^2) = 1 + x + x^2 - x - x^2 - x^3$

$= 1 - x^3$

e) $(0.2x + 0.3y)(0.04x^2 - 0.06xy + 0.9y^2)$

$= 0.08x^3 - 0.12x^2y + 0.18xy^2 + 0.12x^2y - 0.18xy^2 + 0.27y^3$

$= 0.08x^3 + 0.27y^3$

f) $(25x^2 + 15xy + 9y^2)(5x - 3y)$

$= 125x^3 + 75x^2y + 45xy^2 - 75x^2y - 45xy^2 - 27y^3$

$= 125x^3 - 27y^3$

g) $(y + 7)(y + 5) = y^2 + 7y + 5y + 35$

$= y^2 + 12y + 35$

h) $(x - 3)(x - 5) = x^2 - 5x - 3x + 15$

$= x^2\ 8x + 15$

2. Write the expressions for each of the following:

a) $(x + 2y + 3z)^2 = (x + 2y + 3z)(x + 2y + 3z)$

$= x^2 + 2xy + 3xz + 2xy + 4y^2 + 6yz + 3xz + 6yz + 9z^2$

$= x2 + 4y2 + 9z2 + 4xy + 12yz + 6xz$

b) $(a + b - 2c)^2 = (a + b - 2c)(a + b - 2c)$

$= a^2 + ab - 2ac + ab + b^2 - 2bc - 2ac - 2bc + 4c^2$

$= a^2 + b^2 + 4c^2 + 2ab - 2ac - 4ac - 4bc$

c) $(2p - 2q - 3r)^2 = (2p - 2q - 3r)(2p - 2q - 3r)$

$= 4p^2 - 4pq - 6pr - 4pq + 4q^2 + 6qr - 6pr + 6qr + 9r^2$

$= 4p^2 + 4q^2 + 9r^2 - 8pq + 12qr - 12pr$

3. Multiply :

a) $5abc, 10a^2b^2c^2, -3a^2b^3c^4$ and $6a^2b^2c^5$

$= (5abc)(10a^2b^2c^2)(-3a^2b^3c^4)(6a^2b^2c^5)$

$= -900a^7b^8c^{12}$

b) $8abc, 4a^3b^2c^2, 3a^2b^2c^2$ and $-2bc$

$= (-8abc)(4a^3b^2c^2)(3a^2b^2c^2)(-2bc)$

$= 192a^6b^6c^6$

c) $(3x+5)^3 - (3x-5)^3 =$

(i) $(3x+5)^3 = (3x)^3 + (5)^3 + 3(3x)(5)[3x+5]$

$= 27x^3 + 125 + 45x[3x+5]$

$= 27x^3 + 135x^2 + 225x + 125$

(ii) $(3x-5)^3 = (3x)^3 - (5)^3 - 3(3x)(5)[3x-5]$

$= 27x^3 - 125 - 45x[3x-5]$

$= 27x^3 - 135x^2 + 225x - 125$

(i) − (ii) $= 27x^3 + 135x^2 + 225x + 125 - 27x^3 + 135x^2 - 225x + 125$

$= 270x^2 + 250$

d) $(a-b)^3 - (a+b)^3$

(i) $(a-b)^3 = a^3 - b^3 - 3ab[a-b]$

$= a^3 - b^3 - 3a^2b + 3ab^2$

(ii) $(a+b)^3 = a^3 + b^3 + 3ab[a+b]$

$= a^3 + b^3 + 3a^2b + 3ab^2$

(i) − (ii) $= a^3 - b^3 - 3a^2b + 3ab^2 - a^3 - b^3 - 3a^2b - 3ab^2$

$= -2b^3 - 6a^2b$

4. Find value of $a^3 + 8b^3$ if $a + 2b = 10$ and $ab = 15$.

Given : $a + 2b = 10$

On cubing both sides $= (a + 2b)^3 = 10^3$

$= a^3 + (2b)^3 + 3(a)(2b)[a+2b] = 10^3$

$= a^3 + 8b^3 + 6ab[a+2b] = 10^3$

$= a^3 + 8b^3 + 6(15)[10] = 1000$

$= a^3 + 8b^3 + 90 \times 10 = 1000$

$= a^3 + 8b^3 = 1000 - 900$

$a^3 + 8b^3 = 100$

5. Multiply $\frac{-4}{3}xy^3$ by $\frac{6}{7}x^2y$ and verify your result for $x = 2$ and $y = 1$:

$$\left[-\frac{4}{3}xy^3\right] \times \left[\frac{6}{7}x^2y\right] = -\frac{8x^3y^4}{7}$$

$$= -\frac{8(2)^3(1)^4}{7}$$

$$= -\frac{8 \times 8 \times 1}{7} = -\frac{64}{7}$$

6. Find the product of $(x + 2y)$ and $(x - 2y)$ and verify your result for $x = 1$ and $y = 0$:

$(x+2y)(x-2y) = x^2 - 2xy + 2xy - 4y^2$

$= x^2 - 4y^2$

$= (1)^2 - 4(0)^2 = 1$

Exercise – 6.3

1. Find the product of the following:

a) $(y+3)(y-6) = y^2 - 6y + 3y - 18$

$= y^2 - 3y - 18$

b) $(x^3 - 7)(x^3 + 10) = x^6 + 10x^3 - 7x^3 - 70$

$= x^6 + 3x^3 - 70$

c) $(x^2 - 7)(x^2 - 5) = x^4 - 5x^2 - 7x^2 + 35$

$= x^4 - 12x^2 + 35$

d) $(2x+3)(2x-6) = 4x^2 - 12x + 6x - 18$

$= 4x^2 - 6x - 18$

e) $(4x^2 - 7)(4x^2 + 2) = 16x^4 + 8x^2 - 28x^2 - 14$

$= 16x^4 - 20x^2 - 14$

f) $(3x+4y)(3x+7y) = 9x^2 + 21xy + 12xy + 28y^2$

$= 9x^2 + 33xy + 28y^2$

g) $(9x^2 + 3)(9x^2 - 3) = 81x^4 - 27x^2 + 27x^2 - 9$

$= 81x^4 - 9$

h) $(9x+7)(9x-7) = 81x^2 - 63x + 63x - 49$

$= 81x^2 - 49$

i) $(12x^2 - 13y^2)(12x^2 + 13y^2) = 144x^4 + 156x^2y^2 - 156x^2y^2 - 169y^4$

$= 144x^4 - 169y^4$

j) $\left(a + \frac{1}{a}\right)\left(a - \frac{1}{a}\right) = a^2 - a/a + a/a - 1/a^2$

$= a^2 - \frac{1}{a^2}$

2. Expand the following by using identities:

a) $\left[\frac{4}{7} - 21x\right]^2 = (4/7)^2 - 2(4/7)(21x) + (21x)^2$

$= \frac{4^2}{7^2} - 2(\frac{4}{7})(21x) + (21x)^2$

$= \frac{16}{49} - \frac{168x}{7} + 9261x^2$

$= \frac{16}{49} - 24x + 441x^2$

b) $\left[9x - \frac{2}{3}y^2\right]^2 = (9x)^2 - 2(9x)(\frac{2}{3}y^2) + (\frac{2y^2}{3^2})^2$

$= 81x^2 - \frac{36xy^2}{3} + \frac{4y^4}{9}$

$= 81x^2 - 12xy^2 + \frac{4y^4}{9}$

c) $(4x^2 - 3y^3)^2 = (4x^2)^2 - 2(4x^2)(3y^3) + (3y^3)^2$

$= 16x^4 - 24x^2y^3 + 9y^6$

d) $(2x - 3y)^2 = (2x)^2 - 2(2x)(3y) + (3y)^2$

$= 4x^2 - 12xy + 9y^2$

e) $\left[\frac{3}{4}x^2 - 5p\right]^2 = (\frac{3x^2}{4^2})^2 - 2(\frac{3x^2}{4})(5p) + (5p)^2$

$= \frac{9x^4}{16} - \frac{15x^2p}{2} + 25p^2$

f) $(x^4 + 3)^2 = (x^4)^2 + 2(x^4)(3) + (3)^2$

$= x^8 + 6x^4 + 9$

g) $(3x + 7)^2 = (3x)^2 + 2(3x)(7) + (7)^2$

$= 9x^2 + 42x + 49$

h) $(3x^2 + 7)^2 = (3x^2)^2 + 2(3x^2)(7) + (7)^2$

$= 9x^4 + 42x^2 + 49$

3. Solve the following:

a) $492 = (50-1)^2 = (50)^2 - 2(50)(1) + (1)^2$

$= 2500 - 100 + 1 = 2401$

b) $297 \times 303 = (300-3)(300+3) = (300)^2 - (3)^2$

$= 90000 - 9 = 89991$

c) $27^2 = (30-3)^2 = (30)^2 - 2(30)(3) + (3)^2$

$= 900 - 180 + 9$

$= 729$

d) $98 \times 99 = (100-2)(100-1)$

$= (100)^2 - (100)(1) - (2)(100) + (2)(1)$

$= 10000 - 100 - 200 + 2$

$= 9702$

e) $10.7^2 = (10+0.7)^2$

$= (10)^2 + 2(10)(0.7) + (0.7)^2$

$= 100 + 14 + 0.49$

$= 114.49$

f) $9.7 \times 9.8 = (10-0.3)(10-0.2)$

$= 10^2 - 10(0.2) - 0.3(10) + 0.3(0.2)$

$= 100 - 2 - 3 + 0.06$

$= 95.06$

g) $(1.0)^2 - (0.98)^2 = (1.0)^2 - [1-0.02]^2$

$= 1 - [1^2 - 2(1)(0.02) + (0.02)^2]$

$= 1 - [1 - 0.04 + 0.0004]$

$= 0.0396$

h) $153^2 - 147^2 = (150+3)^2 - (150-3)^2$

$= 150^2 + 2(150 \times 3) + 3^2 - [150^2 - 2(150 \times 3) + 3^2]$

$= 23409 - 21609$

$= 1800$

i) $998^2 = (1000-2)^2$

$= (1000)^2 - 2(1000)(2) + (2)^2$

$= 1000000 - 4000 + 4$

$= 996004$

4. Find the value of x, if:

a) $20x = 60^2 - 40^2$

$= (60+40)(60-40)$

$= (100)(20)$

$20x = 2000$

$x = \frac{2000}{20} = 100$

b) $36x^2 = 120^2 - 48^2$

$= (120+48)(120-48)$

$= (168)(72)$

$36x^2 = 12096$

$x^2 = \frac{12096}{36} = 336$

$x = \sqrt{336}$

$x = 18.33$

5. If $x + \frac{1}{x} = 9$, find $x^2 + \frac{1}{x^2}$

Squaring both sides : $x + \frac{1}{x} = 9$

We have :

$\Rightarrow \left[x + \frac{1}{x}\right]^2 = (9)^2$

(Squaring both sides)

$\Rightarrow \quad x^2 + \frac{1}{x^2} + 2(x)(\frac{1}{x}) = 81$

$\Rightarrow \quad x^2 + \frac{1}{x^2} + 2 = 81$

$\Rightarrow \quad x^2 + \frac{1}{x^2} = 81 - 2$

$\Rightarrow \quad x^2 + \frac{1}{x^2} = \mathbf{79}$

6. If $x - \frac{1}{x} = 5$, find $x^2 - \frac{1}{x^2}$

We have :

$\Rightarrow \quad \left[x + \frac{1}{x}\right]^2 = (5)^2$

(Squaring both sides)

$\Rightarrow \quad x^2 + \frac{1}{x^2} - 2(x)(\frac{1}{x}) = 25$

$\Rightarrow \quad x^2 + \frac{1}{x^2} - 2 = 25$

$\Rightarrow \quad x^2 + \frac{1}{x^2} = 25 + 2$

$\Rightarrow \quad x^2 + \frac{1}{x^2} = \mathbf{27}$

$\Rightarrow \quad x^2 - \frac{1}{x^2} = \mathbf{27^{-1}}$

7. If $x + y = 8$ and $xy = 3$, find $x^2 + y^2$.

$(x+y)^2 = (8)^2$ (Squaring both sides)

$x^2 + y^2 + 2xy = 64$

$x^2 + y^2 = 64 - 2xy$

$= 64 - 2(3)$

$= 64 - 6$

$= 58$

8. If $x - y = 10$ and $xy = -2$, find $x^2 + y^2$.

$(x-y)^2 = (10)^2$ (Squaring both sides)

$x^2 + y^2 - 2xy = 100$

$x^2 + y^2 = 100 + 2xy$

$= 100 + 2(-2)$

$= 100 - 4$

$= 96$

Exercise – 6.4

1. Factorize following expressions:

$16a^2 - 40ab + 25b^2$: $16a^2 - 20ab - 20ab + 25b^2$

$4a(4a-5b) - 5b(4a-5b)$

$(4a-5b)(4a-5b)$

2. $x^2 + y^2 + 2xy = x^2 + 2xy + y^2$

$= x^2 + xy + xy + y^2$

$= x(x+y) + y(x+y)$

$= (x+y)(x+y)$

3. $121a^2 - 66ab + 9b^2 = 121a^2 - 66ab + 9b^2$

$= 121a^2 - 33ab - 33ab + 9b^2$

$= 11a(11a-3b) - 3b(11a-3b)$

$= (11a-3b)(11a-3b)$

4. $4x^2 - 4xy + y^2 = 4x^2 - 4xy + y^2$

$= 4x^2 - 2xy - 2xy + y^2$

$= 2x(2x-y) - y(2x-y)$

$= (2x-y)(2x-y)$

5. $4x^2 - 4xy + y^2 - 9z^2 = [4x^2 - 4xy + y^2] - 9z^2$

$= [4x^2 - 2xy - 2xy + y^2] - 9z^2$

$= [2x(2x-y) - y(2x-y)] - 9z^2$

$= [(2x-y)(2x-y)] - 9z^2$

$= (2x-y)^2 - (3z)^2$

$= (2x-y+3z)(2x-y-3z)$

6. $49p^4 - 28p^2q + 4q^2 = 49p^4 - 28p^2q + 4q^2$

$= 49p^4 - 14p^2q - 14p^2q + 4q^2$

$= 7p^2(7p^2 - 2q) - 2q(7p^2 - 2q)$

$= (7p^2 - 2q)(7p^2 - 2q)$

7. $p^2 - q^2 + 2p + 1 = p^2 + p + p - q^2 + 1$

$= p^2 + p + p + 1 - q^2$

$= p(p+1) + 1(p+1) - q^2$

$= (p+1)(p+1) - q^2$

$= (p+1)^2 - (q)^2$

$= (p+1+q)(p+1-q)$

$= (p+q+1)(p-q+1)$

8. $\frac{x^2}{4y^2} - \frac{1}{3} + \frac{y^2}{9x^2 4} = \frac{(x)^2}{(y)^2} - \frac{1}{3} + \frac{(y)^2}{(3x)^2}$

$= \frac{(x)^2}{(y)^2} - \frac{xy}{6xy} - \frac{xy}{6xy} + \frac{(y)^2}{(3x)^2}$

$= \frac{x}{2y}\left[\frac{x}{2y} - \frac{y}{3x}\right] - \frac{y}{3x}\left[\frac{x}{2y} - \frac{y}{3x}\right]$

$= \left[\frac{x}{2y} - \frac{y}{3x}\right]\left[\frac{x}{2y} - \frac{y}{3x}\right]$

9. $16(2x-1)^2-25z^2 = 16[(2x-1)^2]-25z^2$
$= 16[(2x+1)(2x-1)]-25z^2$
$= 16[(4x^2-2x+2x-1)]-25z^2$
$= 16(4x^2-1)-25z^2$
$= 64x^2-25z^2-16$
$= (8x)^2-(5z)^2-(4)$
$= (8x-5z+4)(8x-5z-4)$

10. $a^2-8ab+16b^2+25p^2 = [a^2-8ab+16b^2]+25p^2$
$= [a^2-4ab-4ab+16b^2]+25p^2$
$= [a(a-4b)-4b(a-4b]+25p^2$
$= [(a-4b)(a-4b]+25p^2$
$= (a-4b)^2+(5p)^2$
$= (a-4b+5p)(a-4b-5p)$

11. $x^4-4 = (x^2)^2-22$
$= (x^2+2)(x^2-2)$

12. $81a^4-121a^2 = a^2[(9a)^2-(11)^2]$
$= a^2[(9a+11)(9a-11)]$

13. $a^2+14a+48 = a^2+8a+6a+48$
$= a(a+8)+6(a+8)$
$= (a+6)(a+8)$

14. $t^2+23t+120 = t^2+23t+120$
$= t^2+8t+15t+120$
$= t(t+8)+15(t+8)$
$= (t+15)(t+8)$

15. $y^2+12y+36 = y^2+6y+6y+36$
$= y(y+6)+6(y+6)$
$= (y+6)(y+6)$

16. $25x^2+10x+1-36y^2 = [25x^2+5x+5x+1]-36y^2$
$= [5x(5x+1)+1(5x+1)]-36y^2$
$= [(5x+1)(5x+1)]-36y^2$
$= (5x+1)^2-(6y)^2$
$= (5x+1+6y)(5x+1-6y)$

17. $x^4-5x^3-24x^2 = x^2[x^2-5x-24]$
$= x^2[x^2-8x+3x-24]$
$= x^2[x(x-8)+3(x-8)]$
$= x^2[(x+3)(x-8)]$

18. $-12y^2+14y+10 = -12y^2+14y+10$
$= -2[6y^2-7y-5]$
$= -2[6y^2+3y-10y-5]$
$= -2[3y(y+1)-5(2y+1)]$
$= -2[(3y-5)(2y+1)]$

19. $32a^2-50b^2 = 2[16a^2-25b^2]$
$= 2[(4a)^2-(5b)^2]$
$= 2[4a+5b)(4a-5b)$

20. $9x^2-6x+1 = 9x^2-6x+1$
$= 9x^2-3x-3x+1$
$= 3x(3x-1)-1(3x-1)$
$= (3x-1)(3x-1)$

21. $a(x+y)+b(x+y) = a(x+y)+b(x+y)$
$= (a+b)(x+y)$

22. $x^2(a+b)+y^2(a+b)+z^2(a+b)$
$= (x^2+y^2+z^2)(a+b)+y^2(a+b)(a+b)$

23. $3a^2-48b^2 = 3[a^2-16b^2]$
$= 3[(a)^2-(4b)^2]$
$= 3[(a+4b)(a-4b)]$

24. $16a^4+8a^2+1 = 16a^4+4a^2+4a^2+1$
$= 4a^2(4a^2+1)+1(4a^2+1)$
$= (4a^2+1)(4a^2+1)$

Exercise – 6.5

1. Simplify each of the following:

a) $\frac{ab^6}{ab} = b^5$

b) $\frac{12x^{10}y^5}{4x^2y} = 3x^8y^4$

c) $\frac{-12a^3b^3}{-4b} = 3a^3b^2$

d) $\frac{-10x^3y^2}{2xy^2} = -5x^2$

e) $\frac{-a^4}{4a^2b} = \frac{-a^2}{4b}$

f) $\frac{60x^2y^2z^2a^3}{-10x^2z^2a} = -6y^2a^2$

2. Simplify:

a) $\frac{-9a^2-12b^2}{3} = -3a^2-4b^2$

b) $\frac{(16x^2-2xy)}{(-3xy)} = \frac{(16x^2}{-3xy} - \frac{2xy)}{3xy}$

$= \frac{16x}{3y} + \frac{2}{3}$

c) $\frac{14a^2b + 21ab}{-7ab} = -2a - 3$

d) $\frac{-18p^6q^3r^4 - 27p^5r^3}{-9p^3r^3} = 2p^3q^3r + 3p^2$

e) $\frac{-15a^7 - 12a^3}{-3a} = 5a^6 - 4a^2$

f) $\frac{20x^2 - 10x^3}{-5x} = -4x + 2x^2 - 2x + x^2$

3. If $6x^2$ copies weigh $(2yx^5 - 30x^3)$ kg. find the weight of 1 copy.

Total weight $6x^2$ copies $= \frac{2yx^5 - 30x^3}{6x^2}$

Weight of 1 copy $= \left[\frac{x^3y}{3} - 5x\right]$ kg

4. If area of rectangular field is $(14x3 - 35x)$ m^2 and length is 7x m. Find its breadth.

Length is = 7x m.

Area of rectangular field = $(l \times b)$ = $14x^3 - 35x\ m^2$

= $(7x \times b)$ = $14x^3 - 35x\ m^2$

Breadth = (b) = $\frac{14x^3 - 35x}{7x}$

= $2x^2 - 5$ m

5. $(40x^2y^3 + 64x^2y)$ sweets are distributed among 8xy children. Find the number of sweets each child gets.

No. of Children = 8xy

Total no. of sweets = $40x^2y^3 + 64x^2y$

Each child will get = $\frac{40x^2y^3 - 64x^2y}{8xy}$

= $5xy^2 + 8x$ sweets

Exercise – 6.6

1. Divide:

a) $x^3 - y^3$ by $x - y$

$$
\begin{array}{r}
x^2 + y^2 + xy \\
x - y \overline{)\ x^3 - y^3} \\
x^3 \quad - x^2y \\
- \quad + \\
\hline
-y^3 + x^2y \\
-y^3 \quad + xy^2 \\
+ \quad - \\
\hline
x^2y - xy^2 \\
x^2y - xy^2 \\
- \quad + \\
\hline
0
\end{array}
$$

b) $(a + b)^3$ by $a + b$

$$
\begin{array}{r}
a^2 + 2ab + b^2 \\
a + b \overline{)\ a^3 + 3a^2b + 3ab^2 + b^3} \\
a^3 + a^2b \\
- \quad - \\
\hline
2a^2b + 3ab^2 + b^3 \\
2a^2b + 2ab^2 \\
- \quad - \\
\hline
ab^2 + b^3 \\
ab^2 + b^3 \\
- \quad - \\
\hline
0
\end{array}
$$

c) $8x^3 - 27y^3$ by $2x - 3y$

$$
\begin{array}{r}
4x^2 + 6xy + 9y^2 \\
2x - 3y \overline{)\ 8x^3 - 27y^3} \\
8x^3 \quad - 12x^2y \\
- \quad \\
\hline
-12x^2y - 27y^3 \\
+12x^2y \quad - 18xy^2 \\
- \quad + \\
\hline
18xy^2 - 27y^3 \\
18xy^2 - 27y^3 \\
- \quad + \\
\hline
0
\end{array}
$$

d) $a^3 + b^3$ by $a + b$

$$
\begin{array}{r}
a^2 + b^2 + ab \\
a - b \overline{)\ a^3 + b^3} \\
a^3 \quad + a^2b \\
- \quad - \\
\hline
b^3 + a^2b \\
b^3 \quad + ab^2 \\
+ \quad - \\
\hline
a^2b + ab^2 \\
a^2b + ab^2 \\
- \quad - \\
\hline
0
\end{array}
$$

e) $y^2 + 8y + 15$ by $y + 5$

$$
\begin{array}{r}
y + 3 \\
y + 5 \overline{)\ y^2 + 8y + 15} \\
y^2 + 5y \\
- \quad - \\
\hline
3y + 15
\end{array}
$$

2. Simplify:

a) $\frac{8y^3 - 1000}{2y - 10} = \frac{(2y)^3 - (10)^3}{2y - 10}$

$= \frac{(2y - 10)[(2y)^2 + (2y)(10) + (10)^2]}{2y - 10}$

$= 4y^2 + 20y + 100$

b) $\frac{x^2 + 7x + 12}{x + 3} = \frac{x^2 + 4x + 3x + 12}{x + 3}$

$= \frac{x^2 + 4x + 3x + 12}{x + 3}$

$= \frac{x(x + 4) + 3(x + 4)}{x + 3}$

$= \frac{(x + 3)(x + 4)}{x + 3}$

$= x + 4$

c) $\frac{a^3 + b^3}{a^2 - ab + b^2} = \frac{(a + b)(a^2 - ab + b^2)}{a^2 - ab + b^2}$

$= (a + b)$

d) $\frac{x^3 - y^3}{x - y} = \frac{(x - y)(x^2 + xy + y^2)}{x - y}$

$= x^2 + xy + y^2$

e) $\frac{64p^3 - 125q^3}{16p^2 + 20pq + 25q^2}$

$= \frac{(4p)^3 - (5q)^3}{(4p)^2 + (4)(5)(pq) + (5q)^2}$

$= \frac{(4p - 5q)[(4p)^2 + (4p)(5q) + (5q)^2]}{(4p)^2 + (4)(5)(pq) + (5q)^2}$

$= (4p - 5q)$

f) $\frac{-15p^2q^{3r}}{3pq^r} = -5pq^{2r}$

g) $\frac{18x^4y^2 + 7x^4y^2}{5x^2y} = \frac{25x^4y^2}{5x^2y}$

$= 5x^2y$

h) $\frac{56x^9y^5}{7x^4y^3} = 8x^5y^2$

Revision Exercise

1. Tick (✓) the correct option:

a) (iv) All b) (iv) 3

c) (iii) 1 d) (iv) 3

2. Add the following algebraic expressions:

a) $\frac{3a}{2} - \frac{5b}{4} + \frac{2c}{5}$; $\frac{2a}{3} - \frac{7b}{2} + \frac{7c}{2}$;

$\frac{5a}{3} + \frac{5b}{2} - \frac{5c}{4}$

$= \left[\frac{3a}{2} + \frac{2a}{3} + \frac{5a}{3}\right] = \frac{9a + 4a + 10a}{6} = \frac{23a}{6}$

$= \left[\frac{-5b}{4} - \frac{7b}{2} + \frac{5b}{2}\right] = \frac{-5b - 14b + 10b}{4} = \frac{-9b}{4}$

$= \left[\frac{2c}{5} + \frac{7c}{2} - \frac{5c}{4}\right] = \frac{8c + 70c - 25c}{20} = \frac{53c}{20}$

$\mathbf{\frac{23a}{6} - \frac{9b}{4} + \frac{53c}{20}}$

b) $\frac{7x^3}{2} - \frac{1x^2}{2} + \frac{5}{3}$; $\frac{3x^3}{2} + \frac{7x^2}{4} - x + \frac{1}{3}$;

$\frac{3x^2}{2} - \frac{5x}{2} - 2$

$= \left[\frac{7x^3}{2} + \frac{3x^3}{2}\right] = \frac{10x^3}{2} = 5x^3$

$= \left[-\frac{1x^2}{2} + \frac{7x^2}{4} + \frac{3x^2}{2}\right] = \frac{-2x^2 + 7x^2 + 6x^2}{4} = \frac{11x^2}{4}$

$= \left[-x - \frac{5x}{2}\right] = \frac{-2x - 5x}{2} = \frac{-7x}{2}$

$= \left[\frac{5}{3} + \frac{1}{3} - 2\right] = \frac{5 + 1 - 6}{3} = 0$

$\mathbf{= 5x^3 + \frac{11x^2}{4} - \frac{7x}{2}}$

c) $5a + 3b - 4$; $7a + 6b - 7$; $3a + 2b$

$= 5a + 7a + 3a + 3b + 6b + 2b - 4 - 7$

$= 15a + 11b - 11$

3. Subtract:

$x^2y - \frac{4}{5}xy^2 + \frac{4xy}{3}$ from $\frac{2x^2y}{3} + \frac{3xy^2}{2} - \frac{1xy}{3}$

$$= \frac{2}{3}x^2y + \frac{3}{2}xy^2 - \frac{1}{3}xy$$

$$= x^2y - \frac{4}{5}xy^2 + \frac{4}{3}xy$$

$$- \quad + \quad -$$

$$-\frac{1}{3}x^2y + \frac{23}{10}xy^2 - \frac{5}{3}xy$$

4. Divide:

a) $20x^2yz$ by $4xyz = \frac{20x^2yz}{4xyz} = 5x$

b) $12x^2y^3$ by $-3xy = \frac{12x^2y^3}{-3xy} = -4xy^2$

c) $12x^5 + 15x^4 - 6x^3$ by $3x^2 = \frac{12x^5 + 15x^4 - 6x^3}{3x^2}$
$= 4x^3 + 5x^2 - 2x$

d) $20x^3y - 12x^2y^2 + 10xy \div 2xy = \frac{20x^3y - 12x^2y^2 + 10xy}{2xy}$
$= 10x^2 - 6xy + 5$

5. Evaluate following using identities:

a) $\frac{(3.25)^2 - (0.25)^2}{3}$

$= \frac{(3.25 + 0.25)(3.25 - 0.25)}{3}$

$= \frac{(3.50)(3)}{3} = \mathbf{3.50}$

b) $\frac{196 \times 196 - 104 \times 104}{92} = \frac{196^2 - 104^2}{92}$

$= \frac{(196 + 104)}{92}\frac{(196 + 104)}{}$

$= \frac{(300)(92)}{92} = \mathbf{300}$

Chapter – 7 Linear Equations in One Variable

Exercise – 7.1

1) Solve the following equations:

a) $1.2y + \frac{18}{25} = 5y - \frac{39}{35}$

$= 1.2y - 5y = -\frac{39}{35} - \frac{18}{25}$

$= -0.38y = -\frac{195 - 126}{175}$

$= -0.38y = -\frac{321}{175}$

$y = \frac{321}{175 \times 0.38} = 0.48$

b) . $\frac{(0.25 + y)}{3} = y + \frac{1}{2}$

$= 0.50 + 2y = 6y + 3$

$= 6y - 2y = 0.50 - 3$

$= 4y = -2.5$

$y = \frac{-2.5}{4}$

$\mathbf{y = -0.625}$

c) $0.12y + \frac{(0.5 + y)}{2} = \frac{y}{3} + 1.5$

$= 0.24y + (0.5 + y) = \frac{2y}{3} + 3$

$= 0.72y + 1.5 + 3y = 2y + 3$

$= 0.72y + 3y - 2y = 3 - 1.5 = 1.5$

$= 1.72y = 1.5$

$y = \frac{1.5}{1.72}$

$\mathbf{y = 0.872}$

d) $0.3y + 0.5 = 0.4y - 0.2$

$= 3y + 5 = 4y - 2$

$= 3y - 4y = -2 - 5 = -7$

2) Solve following equations and check your answer:

a) $\frac{7y}{5} = y - 4$

$7y = 5y - 20$

$2y = -20$

$\mathbf{y = -10}$

b) $3a + \frac{2}{3} = 2a + 1$

$= 9a + 2 = 6a + 3$

$= 9a - 6a = 3 - 2$

$= a = 1$

$\mathbf{a = \frac{1}{3}}$

c) $15 - (3x - 1) = x - 4$

$= 15 - 3x + 1 = x - 4$

$= -3x - x = -4 - 1 - 15$

$= -4x = -20$

$x = \frac{20}{4}$

$\mathbf{x = 5}$

d) $3(y - 1) = 9$

$= 3y - 3 = 9$

$= 3y = 9 + 3 = 12$

$\mathbf{y = 4}$

3) Solve the following equations:

a) $\frac{2 - 9y}{17 - 4y} = \frac{1}{4}$

$= 8 - 36y = 17 - 4y$

$= -36y + 4y = 17 - 8$

$= -32y = 9$

$\mathbf{y = \frac{-9}{32}}$

b) $\frac{6y - 5}{2y} = \frac{7}{9}$

$= \frac{6y - 5}{2y} = \frac{7}{9}$

$= 54y - 45 = 14y$

$= 54y - 14y = 45$

$= 40y = 45$

$\mathbf{y = \frac{9}{8}}$

c) $\frac{4x + 7}{9 - 3x} = \frac{4}{5}$

$= 20x + 35 = 36 - 12x$

$= 20x + 12x = 36 - 35$

$= 32x = 1$

$\mathbf{= x = \frac{1}{32}}$

d) $\frac{3x}{5x + 2} = -3$

$= 3x = -15x - 6$

$= 3x + 15x = -6$

$= 18x = -6$

$x = -\frac{6}{18}$

$\mathbf{x = -\frac{1}{3}}$

Exercise – 7.2

1. The sum of three consecutive even numbers is 42. Find the numbers.

Let 3 consecutive even nos. : $a, a+2, a+4$

We have : $(a) + (a+2) + (a+4) = 42$

$= 3a + 6 = 42$

$= 3a = 42 - 6 = 36$

$= 3a = 42 - 6 = 36$

$\therefore a = \frac{36}{3} = 12$

1st consecutive even no. $= a = 12$

2nd consecutive even no. $= a + 2 = 14\ (12 + 2)$

1st consecutive even no. $= a + 4 = 16\ (12 + 4)$

2. The breadth of a rectangle is 2/3rd of its length. If perimeter is 140metres, find dimensions of rectangle.

Let Length of rectangle be : a

$\therefore$ Breadth : $\frac{2a}{3}$

Perimeter of rectangle : $2(l + b) : 2(a + \frac{2a}{3})$

$= 140\ m$

$= 2(3a + 2a) = 420\ m$

$= 6a + 4a = 420\ m$

$= 10a = 420\ m$

$a = 42\ m$

$\therefore$ Length $= a = 42\ m$

$\therefore$ Breadth $= \frac{2a}{3} = \frac{2}{3} \times 42 = 28\ m$

3. Divide Rs. 200 into two parts such that 1/3 of the first and 1/2 of the second are equal.

Let amount be : a

1st part of amount = Rs. $\frac{a}{3}$

2nd part of amount = Rs. $\frac{a}{2}$

$\therefore$ As per question $= \frac{a}{3} + \frac{a}{2} =$ Rs. 200

$= \frac{2a + 3a}{6} =$ Rs. 200

$= 5a = 1200$

$= a = 240$

1st part of amount $=$ Rs. $\frac{a}{3} = \frac{240}{3} =$ **Rs. 80**

2nd part of amount $=$ Rs. $\frac{a}{2} = \frac{240}{2} =$ **Rs. 120**

4. Lata's mother is four times as old as Lata. After 5 years, her mother will be three times as old as she will be then. Find their present ages:

	Present age	**After 5 years**
Lata	$= a$	$a + 5$
Mother	$= 4a$	$4a + 5$

As per question : $3(a + 5) = 4a + 5$

$= 3a + 15 = 4a + 5$

$= 3a - 4a = 5 - 15$

$= -a = -10$

$= a = 10$

Lata $= a = 10$ years

Mother $= 4a = 40$ years (4×10)

5. 4 years ago, my father's age was 4 times that of my age. At present, sum of my father's age and that of mine is 53 years, what are our present ages?

	My Age	My father's Age
4 years ago	$= a$	$4a$
Present age	$= a + 4$	$4a + 4$

As per question : $(a + 4) + (4a + 4) = 53$

$= a + 4a = 53 - 8$

$= 5a = 45$

$= a = 9$

My age $= a + 4 = 9 + 4 = 13$ years

Father's age $= 4a + 4 = 4 \times 9 + 4 = 40$ years

6. Roshan is now 9 years older than Pushkar. In 10 years, Roshan will be twice as old as Pushkar was 10 years ago. Find their present ages:

	Present age	After 10 years
Pushkar	$= a$	$a + 10$
Roshan	$= a + 9$	$(a + 9) + 10$

As per question : $2(a - 10) = a + 9 + 10$

$= 2a - 20 = a + 19$

$= a = 39$

Pushkar $= a = 39$ years

Roshan $= a + 9 = 39 + 9 = 48$ years

7. Sum of two-digit number is 9. If we interchange order of digits, number formed is 27 more than given number. Find number:

$10x + y = 9$

$y = 9 - 10x$

$y + 10x = 9 + 27$ (As per question)

$y = 9 - 10x$

$10x + (9 - 10x) = 36$

$10x + 9 - 10x = 36$

8. A number was multiplied by 5 and added 10 to it. The result is 40. Find the number:

Let original number be $= a$

As per question $= (a \times 5) + 10 = 40$

$= 5a + 10 = 40$

$= 5a = 30$

$a = 6$

9. The present age of Ritesh is 1/5 times his mother's age. 5 years later, his age will be 1/3 times his mother's age of that time. Find their present ages:

	Ritesh's Age	Mother's Age
Present age	$= \frac{a}{5}$	a
5 years later	$= \frac{a + 5}{5}$	$a + 5$
As per question :	$\frac{a + 5}{5}$	$= \frac{1(a + 5)}{3}$
	$= \frac{a + 25}{5}$	$= \frac{a + 5}{3}$
	$= 3a + 75$	$= 5a + 25$
	$= 2a$	$= 50$
Mother's Age	$= a$	$= 25$
Ritesh's Age	$= \frac{a}{5}$	$= \frac{25}{5}$
	$=$ **a**	$=$ **5 years**

10. What should be subtracted from four time 3/5 to get 1/5:

$4\frac{3}{5} - a = \frac{1}{5}$

$\frac{12}{5} - a = \frac{1}{5}$

$-a = \frac{1}{5} - \frac{12}{5}$

$-a = \frac{-11}{5}$

$\mathbf{a = \frac{11}{5}}$

11. When 30 is subtracted from thrice a number, we get 90. Find the number:

$3a - 30 = 90$

$3a = 120$

$a = 40$

12. After 15 years, Kirti will be five times as old as she was 5 years ago. Determine her present age:

Kirti's present age = a

After 15 years = a + 15

5 years ago = a - 5

As per question : $5(a-5) = a+15$

$= 5a - 25 = a + 15$

$= 4a = 15 + 25$

$= 4a = 40$

$a = \frac{40}{4}$

$a = 10$ years

13. Naman has 3 times as many two-rupees coins as he has five-rupees coins. If he has total money Rs. 77, how many coins of each type he has?

Total money = Rs. 77

Let 5-rupee coins = x

2-rupee coins = 3x

5-rupee coins		2-rupee coins	Total money
x	+	3(x)	
7	+	3(7) = 21	77
7×5 = Rs. 35	+	21×2 = Rs. 42	
Rs. 35	+	Rs. 42	= 77 Rs.

So, 5-rupee coins = 7

2-rupee coins = 21

14. Rohan takes a number and subtract 5/2 from it. He multiplies the result by 8. The result obtained is 3 times the given number. What is the number?

Rohan takes a number (say) = a

He subtracts 5/2 from it

$= 8(a - 5/2) = 3(a)$

$= 8\left[\frac{2a-5}{2}\right] = 3a$

$= 16a - 40 = 6a$

$= 10a = 40$

$= a = \frac{40}{10}$

$\mathbf{a = 4}$

15. The digit of 2-digit number differs by 3. If digits are interchanged and resulting number added to given number, sum is 143. What is original number?

2-digit number differs by = 3

2-digit number differed by 3 = 8 5

If digits interchanged = (+) 5 8

On adding resulting number = 1 4 3

So, original number = 85

16. A grandmother is 60 years older than his grandson. If she is eleven times older than he. Find their present ages:

Present age of Grandson = a

Present age of Grandmother = a + 60

As per question = 11a = a + 60

$= 11a - a = 60$

$= 10a = 60$

$a = \frac{60}{10}$

Present age of Grandson = a = 6 years

Present age of Grandmother = a + 60 = 66 years

Revision Exercise

1. Tick (✓) the correct option:

(a) (i) 3x - 5 (b) (iii) 9x - 7

(c) (i) 20,28 (d) (i) 20 cm

2. Solve each of following equations and also check your result in each case:

a) $\frac{x+1}{x-1} = \frac{6}{5}$

$= 5x + 5 = 6x - 6$

$\mathbf{x = 11}$

b) $\frac{3x+6}{5} = 12$

$= \frac{3x+30}{5} = 12$

$= 3x + 30 = 60$

$= 3x = 60 - 30 = 30$

$x = \frac{30}{3}$

$\mathbf{x = 10}$

c) $\frac{2x+5}{3} = 3x - 10$

$= 2x + 5 = 9x - 30$

$= 2x - 9x = -30 - 5$

$= -7x = -35$

$= 7x = 35$

$x = \frac{25}{7}$

$\mathbf{x = 5}$

d) $4x + \frac{3}{5} = 5$

$= 20x + 3 = 25$

$= 20x = 22$

$x = \frac{22}{20} = \frac{11}{10}$

$\mathbf{x = \frac{11}{10}}$

e) $\frac{3a-2}{3} + \frac{2a+3}{2} = a + \frac{7}{6}$

$= \frac{6a-4+6a+9}{6} = \frac{6a+7}{6}$

$= 6a = 2$

3. Solve the following:

a) $\frac{2x}{3} - \frac{7x}{6} + \frac{5x}{12} = 3$

$= \frac{2x}{3} - \frac{7x}{6} + \frac{5x}{12} = 3$

$= \frac{8x - 14x + 5x}{12} = 3$

$= 8x - 14x + 5x = 36$

$= -x = 36$

$\mathbf{x = -36}$

b) $\frac{6k+7}{3} - 2 = \frac{9k-3}{3}$

$= \frac{6k+7-6}{3} = \frac{9k-3}{3}$

$= 6k - 9k = -3 - 7 + 6$

$= -3k = -4$

$= k = \mathbf{\frac{4}{3}}$

c) $15(9x - 5) - 13(2x - 9) + 5(x + 4) = 0$

$= 135x - 75 - 26x + 117 + 5x + 20 = 0$

$= 135x - 26x + 5x = 75 - 117 - 20$

$= 114x = -62$

$= x = -\frac{62}{114}$

$\mathbf{x = -\frac{31}{57}}$

d) $\frac{2x+5}{2} = 3x - 10$

$= 2x + 5 = 9x - 30$

$= 5 + 30 = 9x - 2x$

$= 35 = 7x$

$= 7x = 35$

$\mathbf{x = 5}$

e) $3a + 4 = 2a + 16$

$= 3a - 2a = 16 - 4$

4. One of angles of a triangle is thrice sum of other two angles. Find angles.

$a = 3(b + c)$

$a + b + c = 180°$

$3(b + c) + b + c = 180°$

$3b + 3c + b + c = 180°$

$4b + 4c = 180°$

$4(b + c) = 180°$

$(b + c) = 45°$

$a = 3(45°)$

$a = 135°$

$b = 22.5°$

$c = 22.5°$

5. The organizer of art competition decided that a winner gets a price of Rs. 100 and participant who did not win gets Rs. 25. Total price money was Rs. 6000. Find number of winners if total number of participants is 63:

Total price money = Rs. 6000

Total participants = 63

Winner's prize = Rs. 100

Loser's prize = Rs. 25

Winners = 6000/100 = 60

But there are losers also.

So, maximum winners = 59 nos.

Winning amount = 59×100 = Rs. 5900

Balance amount = Rs. 100

Losers = 100/25 = 4 nos.

Total participants = 63 [59 + 4]

3. One of angles of a triangle is half sum of other two angles. Find angle:

$a = \frac{(b + c)}{2}$

$a + b + c = 180^\circ$

$\frac{(b + c)}{2} + b + c = 180^\circ$

$\frac{(b + c) + 2b + 2c}{2} = 180^\circ$

$3b + 3c = 360^\circ$

$3(b + c) = 360^\circ$

$(b + c) = 120^\circ$

$a = \frac{(120^\circ)}{2}$

$a = 60^0$

7. Pawan is thrice as old as his sister. Sum of their ages is 40 years. Find their ages:

Sister's age = x

Pawan's age = 3x

Sum of ages = x + 3x = 40 years

4x = 40

x = 10

Sister's age = x = 10 years

Pawan's age = 3x = 30 years (3 x 10)

Chapter – 8 Percentage and its Applications

Exercise – 8.1

1. Convert each of the following percentages into fractions, ratios and decimals::

a) 25.5%

Fraction : $\frac{25.5}{100} = \frac{255}{1000} = \frac{51}{200}$

Ratio : $\frac{51}{200} = 51 : 200$

Decimal : $\frac{51}{200} = 0.255$

b) $17\frac{3}{5}\%$

Fraction : $17\frac{3}{5}\% = \frac{17.6}{100} = \frac{176}{1000} = \frac{22}{125}$

Ratio : $\frac{22}{125} = 22 : 125$

Decimal : $\frac{22}{125} = 0.176$

c) 0.009%

Fraction : $\frac{0.009}{100} = \frac{9}{100000}$

Ratio : $\frac{9}{100000} = 9 : 100000$

Decimal : $\frac{9}{100000} = 0.00009$

d) 390%

Fraction : $390\% = \frac{390}{100} = \frac{39}{10}$

Ratio : $390\% = \frac{39}{10} = 39 : 10$

Decimal : $390\% = \frac{39}{10} = 3.9$

e) 15%

Fraction : $15\% = \frac{15}{100} = \frac{3}{20}$

Ratio : $15\% = \frac{3}{20} = 3 : 20$

Decimal : $15\% = \frac{3}{20} = 0.15$

f) $\frac{21}{80}\%$

Fraction : $\frac{21\%}{80} = \frac{0.2625}{100}$

$= \frac{2625}{1000000} = \frac{21}{8000}$

Ratio : $\frac{21\%}{80} = \frac{21}{8000}$

$= 21 : 8000$

Decimal : $\frac{21}{80}\% = \frac{21}{8000}$

$= 0.002625$

g) 0.375%

Fraction : $0.375\% = \frac{0.375}{100}$

$= \frac{375}{100000} = \frac{3}{800}$

Ratio : $0.375\% = \frac{3}{800}$

$= 3 : 800$

Decimal : $0.375\% = \frac{3}{800}$

$= 0.00375$

h) 2.05%

Fraction : $2.05\% = \frac{2.05}{100}$

$= \frac{205}{10000} = \frac{41}{2000}$

Ratio : $2.05\% = \frac{41}{2000}$

$= 41 : 2000$

Decimal : $2.05\% = \frac{41}{2000}$

$= 0.0205$

2. Write each of the following as percent:

a) $0.6 = \frac{6}{10} = \frac{6}{10} \times 100$

$= 6 \times 10 = 60\%$

b) $0.75 = \frac{75}{100} = \frac{75}{100} \times 100 = 75\%$

c) $0.05 = \frac{5}{100} = \frac{5}{100} \times 100 = 5\%$

d) $0.003 = \frac{3}{1000} = \frac{3}{1000} \times 100$

$= \frac{3}{10} = 0.3\%$

e) $7.12 = \frac{712}{100} = \frac{712}{1000} \times 100 = 712\%$

f) $11.80 = \frac{1180}{100} = \frac{1180}{100} \times 100$

$= 1180\%$

g) $132.125 = \frac{132125}{1000} = \frac{132125}{1000} \times 100$

$= \frac{132125}{10} = 13212.5\%$

h) $1.003 = \frac{1003}{1000} = \frac{1003}{1000} \times 100$

$= \frac{1003}{10} = 100.3\%$

3. Convert :

a) 5.6% into a decimal fraction.

$5.6\% = \frac{5.6}{100} = \frac{56}{1000} = \frac{7}{125}$

$= 0.056$

b) 42% into a ratio in its simplest form.

$42\% = \frac{42}{100} = \frac{21}{50} = 21 : 50$

c) 0.3% into a fraction.

$0.3\% = \frac{0.3}{100} = \frac{3}{1000}$

d) 0.03% into a decimal fraction.

$0.03\% = \frac{0.03}{100} = \frac{3}{10000} = 0.0003$

Exercise – 8.2

1. Find value of following:

a) 40% of Rs. 1000 $= \frac{40}{100} \times 1000 =$ Rs. 400

b) 60% of 14401 $= \frac{60}{100} \times 14401 = 8640.6$

c) 75% of 20 km $= \frac{75}{100} \times 20 = 15$ km

d) 15% of 400 days. $= \frac{15}{100} \times 400 = 60$ days

e) 32% of Rs. 850 $= \frac{32}{100} \times 850 =$ Rs. 272

f) 135% of 90 cm $= \frac{135}{100} \times 90 = 121.5$ cm

2. Find x in the following, if:

a) 200% of x is 650 $= \frac{200}{100} \times x$

$= 650 = 2x = 650$

$= x = 325$

b) $\frac{3}{2}$% of x is 99 $= \frac{1.5}{100} \times x = 99$

$= \frac{15}{1000} \times x = 99 = 15x = 99000$

$= x = 6600$

c) x% of 750 is 25 $= \frac{x}{100} \times 750 = 25$

$= 750x = 2500$

$= x = \frac{2500}{750}$

$= x = 3.33\%$

d) x% of 25 is 18 $= \frac{x}{100} \times 25$

$= 18 = 25x = 1800$

$= x = \frac{1800}{25}$

$= x = 72\%$

e) 0.3% of x = 3 $= \frac{0.3}{100} \times x = 3$

$= \frac{3}{1000} \times x = 3$

$= 3x = 3000$

$= x = 1000$

f) 2.9% of x = 58 $= \frac{2.9}{100} \times x = 58$

$= \frac{29}{1000} \times x = 58$

$= 29x = 58000$

$= x = \frac{58000}{29}$

3. A man saves Rs. 500 in his saving account per month and spends 80% of his salary. Find his monthly salary.

20% of a = 500 $= \frac{20}{100}$©a $= 500$

$= 20a = 50000$

$= a = \frac{50000}{20}$

$= a =$ Rs. 2500

4. A number is increased by 10% and then decreased by 10%. Find the net increase or decrease percent.

Let No. be = **a**

No. after 10% increase = a + 10%

$= a \times \frac{10}{100} = \frac{\mathbf{a}}{\mathbf{10}}$

No. after 10% increase = $a + \frac{a}{10} = \frac{11a}{10}$

No. after 10% decrease = $\frac{11a}{10}$ - 10%

$= \frac{11a}{10} \times \frac{10}{100} = \frac{\mathbf{11a}}{\mathbf{100}}$

No. after 10% decrease = $\frac{11a}{100} - \frac{a}{10}$

$= \frac{11a - 10a}{100} = \frac{1}{100} \times a$

Nett %age = 1%

Another example:

Let No. be = **100**

No. after 10% increase = 100 × 10%

$= 100 \times \frac{10}{100} =$ **10**

New No. = 100 + 10 = 110

No. after 10% decrease = 110 × 10%

$= 110 \times \frac{10}{100} =$ **11**

New No. = 110 - 11 = 99

Difference w.r.t. original No. = 100 – 99 = **1**

Nett %age $= \frac{\text{Nett increase/decrease}}{\text{Original no.}} \times 100$

$= \frac{1}{100} \times 100$

Nett %age = 1%

5. The strength of an audition is increased by 30% in 1st year and decreased by 10% in 2nd year. If strength of audition, now is 1404, find original strength of school.

1st year :

Let original strength = **a**

30% (+) = $a \times \frac{30}{100} = 0.3a$

New strength = $a + 0.3a = 1.3a$

2nd year :

New strength = **1.3a**

10% (-) = $1.3a \times \frac{10}{100} = 0.13a$

New strength = $1.3a - 0.13a = 1.17a$

As per question = $1.17a = 1404$

$a = \frac{1404}{1.17}$

Original strength = **a** = **1200**

6. Lalit requires 30% to pass. If he gets 200 marks, fails by 10 marks. What is maximum marks?

Marks required to pass = 30%

Passing Marks obtained = 200 + 10 = 210

30% of a = 210

$\frac{30}{100} \times a = 210$

$a = \frac{210 \times 100}{30}$

a = 700 marks

7. The sum of numbers when a number is increased by 10% and decreased by 10% is 100. What is the number?

Let no. be = 10% (+)

Increase = 10% (-)

$\frac{110}{100} \times a + \frac{90}{100} \times a = 100$

$\frac{110a}{100} + \frac{90a}{100} = 100$

$\frac{200a}{100} = 100$

$a = \frac{100 \times 100}{200}$

Number is = a = 50

8. Naveen's income is Rs. 10,000. He saves 15% of his income. If his income increased by 20% and his saving increased by 30%. How much more money does he save now?

Naveen's income = Rs. 10,000.

Saving % = 15%

Old Saving = Rs. 10,000 x 15%

Amount = $\frac{10000}{100} \times 15$ = Rs. 1500

% increase in income = 20%

Amount increased = $\frac{10000}{100} \times 20$

= Rs. 2000

New income = Rs. 10,000 + 2000 = Rs.12,000

Saving % = 30%

New Saving = Rs. 12,000 x 30%

= $\frac{12000}{100} \times 30$

= Rs. 3600

New Saving - old saving = 3600 – 1500

= Rs. 2100

9. A balanced diet should contain 20% proteins, 65% carbohydrates, 10% fats and 5% other things. If an adult needs 3900 calories, find the amount of each type he needs in his diet:

Let things be a + b + c + d

a + b + c + d = 3900 Calories

20% + 65% + 10% + 5% = 3900 Calories

100% = 3900 Calories

Proteins = a = 3900 × 20%

$a = \frac{3900}{100} \times 20$

a = 780 Calories

Carbohydrates b = 3900 × 65%

$b = \frac{3900}{100} \times 65$

b = 2535 Calories

Fats c = 3900 × 10%

$c = \frac{3900}{100} \times 10$

c = 390 Calories

Other things d = 3900 × 5%

$d = \frac{3900}{100} \times 5$

d = 195 Calories

10. Garima's income is 10% less than Arpita. By how much percent is Arpita income more than Garima's?

If Arpita's income Rs. 100,

Garima's income = Rs. 90

If Garima's income Rs. 90,

Arpita's income = 100

If Garima's income Rs. 1,

Arpita's income = $\frac{90}{100}$

If Garima's income Rs. 100,

Arpita's income = $\frac{100\times100}{90}$

$= \frac{1000}{9}$

Hence Garima's income is $\frac{1000}{9} - 100 = \frac{100}{9}\%$

Arpita's income is more than Garima's = $11^{1/9}\%$

11. The value of a taxi decreases annually by 20%. If the present value of the taxi is Rs. 22500, what will be the value after two years?

Present value of taxi = Rs. 22500

% decrease after 1st year = 20% of Rs. 22,500

$= \frac{20}{100} \times 22500$ = Rs. 4500

Decreased value after 1st year

= Rs. 22,500 – 4500 = Rs. 18000

% decrease after 2nd year = 20% of Rs. 18,000

$= \frac{20}{100} \times 18{,}000$

= Rs. 3600

Decreased value after 2nd year

= Rs. 18,000 – 3600 = Rs. 14,400

12. Divide Rs. 5152 among 3 persons so that 1st gets 40% of second and 2nd gets 60% of 3rd:

3rd share be = a

2^{nd} share = 60% of a = $\frac{60}{100} \times a = \frac{3a}{5}$

1^{st} share = 40% of 2^{nd} = $\frac{40}{100} \times \frac{3a}{5} = \frac{6a}{25}$

As per condition: $= a + \frac{3}{5}a + \frac{6a}{25} = 5152$

$= \frac{25a + 15a + 6a}{25} = 5152$

$= \frac{46a}{25} = 5152$

3^{rd} share = a = $\frac{5152 \times 25}{46}$ = 2800

2^{nd} share = $\frac{3a}{5} = \frac{3 \times 2800}{5}$ = 1680

1^{st} share = $\frac{6a}{25} = \frac{6 \times 2800}{25}$ = 672

1^{st} share = **672**

2^{nd} share = **1680**

3^{rd} share = **2800**

13. The value of motorbike depreciates 10% every year. If its present value is Rs. 38700, what was its value one year ago?

Present value of motorbike = Rs. 38,700

% depreciation (10%)

$= P\ 1 - \frac{10}{100} = 38{,}700$

$= P\left[\frac{100 - 10}{100}\right] = 38{,}700$

$= P\left[\frac{90}{100}\right] = 38{,}700$

$= 90P = 3870000$

$= P = \frac{3870000}{90}$

Value of motorbike one year ago = P = 43,000

14. 40% of passengers got down at station X, 75% got down at station Y. If remaining 12 passengers were taken to station Z, find original number of passengers.

Station X:

Let passengers be = ***a***

40% got down = $a \times \frac{40}{100} = \frac{4a}{10}$

Remaining passengers = $a - \frac{4a}{10} = \mathbf{\frac{6a}{10}}$

Station Y:

No. of passengers = $\frac{6a}{10}$

75% got down = $\frac{6a}{10} \times \frac{75}{100} = \frac{9a}{20}$

Remaining passengers = $\frac{6a}{10} - \frac{9a}{20} = \mathbf{\frac{3a}{20}}$

Station Z:

No. of passengers = $\frac{3a}{20}$ = 12

3a = 240

a = $\frac{240}{3}$

a = 80

Original no. of passengers = a = 80 passengers

15. The price of a commodity rose by 10%. By what percent should a lady reduce her consumption so that her expenditure does not increase?

Let rose price be = Rs. 100

Increase 10% = $100 \times \frac{10}{100}$

= 10

New price = Rs. 100 + 10 = Rs. 110

Nett difference = Rs. 110 – 100 = Rs. 11

% reduction in consumption needed = $\frac{100}{11}$

= $9\frac{1}{11}\%$

Exercise – 8.3

1. Jaya bought a car for Rs. 1,75,000 and spent Rs. 15,000 on its repairs. She sold it for Rs. 2,50,000. Find her profit percent.

Jaya bought car for = Rs. 1,75,000

Repair amount = Rs. 15,000

Total cost = Rs. 1,90,000

Selling cost = Rs. 2,50,000

Profit amount = Rs. 60,000 (250,000 – 190,000)

% Profit = P% = $\frac{P \times 100}{CP}$

= $\frac{60{,}000 \times 100}{190{,}000}$

= 31.58%

2. A defective machine costing Rs. 10,000 is being sold at a loss of 30%. If the price of the machine is further reduced by 10%. Find its selling price:

Cost of machine = Rs. 10,000

Loss % = 30%

Loss amount = $10{,}000 \times \frac{30}{100}$

= Rs. 3000

Cost after loss = Rs. 7,000 (10,000 – 3,000)

Reduction % = 10%

Reduction amount = $7{,}000 \times \frac{10}{100}$

= Rs. 700

Total loss amount = Rs. 3,700 (3000 + 700)

Selling price = Rs. 6,300 (10,000 – 3700)

3. Mukesh sells an item for Rs. 1100 and gains 1/10th of its cost price. Find its cost price and gain percent:

SP value given = Rs. 1100

Gain = $1/10^{th}$ of its cost price

SP value given = $P\ 1 + \frac{10}{100}$ = 1100

= $P\left[\frac{100 + 10}{100}\right]$ = 1100

= $P\left[\frac{110}{100}\right]$ = 1100

= 110P = 110000

= P = $\frac{110000}{110}$

Cost price = P = Rs. 1,000

Gain % = P% = 10%

4. A shopkeeper buys 80 articles for Rs. 2400 and sells them at a profit 20%. Find the selling price of 1 article.

Cost of 80 articles = Rs. 2400

Cost of 1 article = Rs. 2400 ÷ 80

= Rs. 30

Profit % = 20%

Profit amount = 30 × 20%

= $30 \times \frac{20}{100}$

= Rs. 6

Selling price of 1 article = Rs. 30 + 6

= Rs. 36

5. By selling 120 oranges, a person gains a profit equal to CP of 20 oranges. Find his profit percent:

CP of 1 orange be = Rs. 1

CP of 120 oranges = Rs. 120

CP of 20 oranges = Rs. 20

Profit = CP of 20 oranges = Rs. 20

SP of 120 oranges = Rs. 140 (120 + 20)

Profit % = P% = $\frac{P \times 100}{CP}$

= P% = $\frac{20 \times 100}{120}$

= 16.67%

6. A fan is sold for Rs. 448 and a profit of 12% is gained. Find cost price of fan:

Profit % = 12%

SP value given = Rs. 448

$$\text{SP value given} = P\left(1 + \frac{12}{100}\right) = 448$$

$$= P\left[\frac{100 + 12}{100}\right] = 448$$

$$= P\left[\frac{112}{100}\right] = 448$$

$$= 112P = 44800$$

$$= P = \frac{44800}{112}$$

Cost price = P = Rs. 400

7. If selling price of 10 copies is equal to cost price of 15 copies. Find gain percent:

CP of 1 copy be = Rs. 1

CP of 15 copies = Rs. 15

CP of 10 copies = Rs. 10

SP of 10 copies = CP of 15 copies = Rs. 15

Profit amount = Rs. 5 (15 - 10)

$$\text{Profit \%} = = P\% = \frac{P \times 100}{CP}$$

$$= P\% = \frac{5 \text{ x } 100}{10}$$

P% = 50%

8. A coat was sold at a gain of 5%. If it has been sold for Rs. 1700 less, he would have suffered a loss of 10%. Find cost price:

Let CP = a

$$SP = \frac{20}{21} \text{ x } a$$

$$\text{As per question} = 90\% \text{ of } a = \frac{20}{21} a - 1700$$

$$= \frac{90a}{100} - \frac{21a}{20} = -1700$$

$$= \frac{15a}{100} = 1700$$

a = Rs. 1133.33

Cost Price = a = Rs. 1133.33

3. After spending Rs. 75,000 on repairing of a farm-house, Gita sold it at a profit of 30%. If the house was sold for Rs. 5,00,000. Find its cost price:

Repairing amount = Rs. 75,000

Profit % = 30%

SP value given = Rs. 5,00,000

As per question: SP

$$= P\left(1 + \frac{30}{100}\right) = 5,00,000$$

$$= P\left[\frac{100 + 30}{100}\right] = 5,00,000$$

$$= P\left[\frac{130}{100}\right] = 5,00,000$$

$$= 130P = 5,00,00,000$$

$$= P = \frac{5,00,00,000}{130}$$

$$= P = 384615.39$$

Cost price = Rs. 3,84,615.39 – 75,000

= Rs. 3,09,615.39

10. Some toffees are bought @ 11 for Rs. 10 and same number at same rate of 9 for Rs. 10. If total toffees are sold at one rupee per toffee. Find loss or gain percent on whole transaction:

CP of 11 toffees = Rs. 10 × 11 = Rs. 110

CP of 9 toffees = Rs. 10 × 9 = Rs. 90

Rs. 200

SP after selling at one rupee profit:

SP of 11 toffees = Rs. 11 × 11 = Rs. 121

SP of 9 toffees = Rs. 11 × 9 = Rs. 99

Rs. 220

Profit (SP – CP) = Rs. 220 – 200 = Rs. 20

$$\text{Profit \%} = \frac{20}{200} \times 100 = 10\%$$

Loss 10%

Exercise – 8.4

1. The marked price of a chair is Rs. 480 and it is available to a retailer at 25% discount. At what price should retailer sell it to have a profit 15%?

List price of chair = Rs. 480

Discount % = 25%

$$\text{Discount amt.} = 480 \text{ x } \frac{25}{100}$$

$= \quad$ Rs. 120

CP of chair $= \quad 480 - 120$

$= \quad$ Rs. 360

Profit % $= \quad 15\%$

Profit amt. $= \quad 360 \times \frac{15}{100}$

$= \quad$ Rs. 54

SP of chair $= \quad$ Rs. $360 + 54$

$= \quad$ Rs. 414

2. A dealer buys an article for Rs. 480. At what price must he mark it so that after allowing a discount of 5% he still makes a profit of 20%?

CP of article $= \quad$ Rs. 480

Profit % $= \quad 20\%$

Profit amt. $= \quad 480 \times \frac{20}{100}$

$= \quad$ Rs. 96

SP $=$ CP + Profit

$= \quad 480 + 96$

$= \quad$ Rs. 576

Marked price $= \frac{100 \times SP}{100 - P\%} = \frac{100 \times 576}{100 - 5}$

$= \frac{100 \times 576}{95} =$

Marked Price = **Rs. 606.31**

3. After allowing successive discounts of 10% and 5%, an almirah is sold for Rs. 500. Find marked price of almirah:

Successive discounts $=$ 10% and 5%

Let Marked Price be $=$ a

For discount 10% $= \frac{10}{100} \times a = \mathbf{\frac{a}{10}}$

Remaining amount $= a - \frac{a}{10} = \frac{9a}{10}$

For discount 5% $= \frac{5}{100} \times \frac{9a}{10} = \mathbf{\frac{9a}{200}}$

Remaining amount $= \frac{9a}{10} - \frac{9a}{200} = \frac{171a}{200}$

Selling price $= \frac{171a}{200}$

According to condition $= \frac{171a}{200} = 500$

$= \quad 191a = \quad 100{,}000$

$= \quad a \quad = \quad 100000 \div 171 \quad =$ Rs. 584.80

Almirah's Marked Price $=$ Rs. 584.80

4. A TV is marked at Rs. 9500. The shopkeeper allows discount of 20% and 10% on it. Find selling price of TV:

CP of TV $=$ Rs. 9500

Successive discounts $=$ 20% and 10%

For discount 20% $= \frac{20}{100} \times 9500$

$= \quad$ Rs. 1900

Remaining amount $=$ Rs. $9500 - 1900$

$= \quad$ Rs. 7600

For discount 10% $= \frac{10}{100} \times 7600$

$= \quad$ Rs. 760

Remaining amount $=$ Rs. $7600 - 760$

$= \quad$ Rs. 6840

Selling Price of TV $=$ Rs. 6,840

5. A shopkeeper offers a discount of 10% and still makes a profit of 20%. What is cost price of article for him whose marked price is Rs. 800?

Marked Price $=$ Rs. 800

Discount (-) 10% $= \frac{10}{100} \times 800 =$ Rs. 80

New Price $=$ Rs. $800 - 80 =$ Rs. 720

Cost Price CP $= \frac{SP \times 100}{100 + P\%} = \frac{720 \times 100}{100 + 20}$

$= \frac{72000}{120} = 600$

Cost Price $=$ **Rs. 600**

6. A trader allows a discount of 10% on the listed price. How much above the cost price he must mark to make a profit of 20%?

Let CP $= \quad$ Rs. 100

SP $= \quad$ Rs. 120

Let MP $= \quad$ a

As per question $=$ 90% of a $= \quad 120$

$= \frac{90}{100} \times a = 120$

$a = 133\frac{1}{3}$

$a = \mathbf{33\frac{1}{3}\%}$

The trader must mark $33\frac{1}{3}\%$ above cost price to make a profit of 20%.

7. A cycle merchant allows 40% discount on marked price of cycle and still makes a marked profit of 40%. If he gains Rs. 300 over the sale of one cycle, what is marked price of cycle?

Let CP = Rs. 100

SP = Rs. 140

60% of MP = 140 (As per question)

$\frac{60}{100} \times MP = 140$

$MP = \frac{140 \times 100}{60}$

$MP = 700/3$

If Profit = Rs. 40, then MP = 700/3

If Profit = Rs. 300, then MP $= \frac{70 \times 300}{40 \times 3}$

= Rs. 1750

8. A businessman marks his goods 40% above the cost price and gives a discount of 20% on the marked price. Find his gain percent:

Let CP = a

Marked Price = (+) 40% $= \frac{140}{100} \times a = \frac{7a}{5}$

SP $= \frac{7a}{5} \times \frac{80}{100} = \frac{28a}{25}$

Profit $= \frac{28a}{25} - a = \frac{3a}{25}$

$= \left[\frac{3a}{25} \div a\right] \times 100 = 12$

Profit % = **12%**

9. Find a single discount equivalent to successive discount 25% and 5%:

Let MP = a

For discount 25% $= a \times \frac{25}{100} = \frac{a}{4}$

Amt. after discount $= a - \frac{a}{4} = \frac{4a - a}{4}$

$= \frac{3a}{4}$

For discount 5% $= \frac{3a}{4} \times \frac{5}{100} = \frac{3a}{80}$

Amt. after discount $= \frac{3a}{4} - \frac{3a}{80} = \frac{57a}{80}$

Single discount $= (a - \frac{57a}{80}) \times 100$

$= \frac{80a - 57a}{80} \times 100$

$= \frac{23a \times 5}{4} = \frac{115a}{4}$

Single discount = **28.75%**

10. A chair is sold for Rs. 1200 after allowing successive discount of 10% and 5%. Find the marked price of the chair.

Let MP = a

For discount 10% $= a \times \frac{10}{100} = \frac{a}{10}$

New MP $= a - \frac{a}{10} = \frac{10a - a}{10}$

$= \frac{9a}{10}$

For discount 5% $= \frac{9a}{10} \times \frac{5}{100} = \frac{9a}{200}$

New MP $= \frac{9a}{10} - \frac{9a}{200} = \frac{180a - 9a}{200}$

$= \frac{171a}{200}$

As per condition $= \frac{171a}{200} = 1200$

$a = \frac{1200 \times 200}{171}$

Marked Price = Rs. 1403.50

11. A businessman marks his goods 20% above the cost price and gives a discount of 5% on the marked price. Find his profit %:

Let CP = a

Marked Price = (+) 20% $= \frac{120}{100} \times a = \frac{6a}{5}$

SP $= \frac{6a}{5} \times \frac{95}{100} = \frac{57a}{50}$

Profit $= \frac{57a}{50} - a = \frac{7a}{50}$

$= \left[\frac{7a}{50} \div a\right] \times 100 = 14$

Profit % = **14%**

Exercise – 8.5

1. Ravina went to a departmental store and purchased the following items:

a) Medicines of Rs. 1000, VAT at the rate of 10%.

b) Clothes for Rs. 2500, VAT at the rate of 12%.

Calculate the total amount paid by Ravina to the departmental store.

CP of Medicines = Rs. 1000

VAT % = 10%

VAT amount = $1000 \times \frac{10}{100}$ = Rs. 100

SP of Medicines = Rs. 1100 (1000 + 100)

CP of Clothes = Rs. 2500

VAT % = 12%

VAT amount = $2500 \times \frac{12}{100}$ = Rs. 300

SP of Medicines = Rs. 2800 (2500 + 300)

Total amount paid by Ravina = Rs. 3900 (1100 + 2800)

2. Nitin bought a dinner set, value Rs. 7000. He gets a rebate of 10% on the bill. If sales tax is at the rate of 5%, find the amount he pays to buy the dinner set.

Nitin bought a dinner set for = Rs. 7000.

Rebate on Bill = 10%

Rebate Amount = Rs. 7000 x $\frac{10}{100}$ = Rs. 700

Amount after rebate = Rs. 6300 (7000 – 700)

Sales Tax % = 5%

Sales Tax amount = 6300 x $\frac{5}{100}$ = Rs. 315

Amount after Sales Tax = Rs. 6615 (6300 + 315)

3. Mahima purchased cosmetics for Rs. 2225. If original price of cosmetics is Rs. 2000, find rate of ST:

SP of Cosmetics = Rs. 2225

CP of Cosmetics = (-) Rs. 2000

ST amount = Rs. 225

Rate of ST = $\frac{ST \times 100}{SP}$

$= \frac{225 \times 100}{2000}$

= Rs. 11.25%

4. Jagat bought a shirt for Rs. 336 including 12% ST and a trouser for Rs. 1100 including 10% ST. Find original price of shirt and trouser together:

Shirt:

SP including VAT = Rs. 336

VAT = 12%

Let SP without VAT = a

VAT = $\frac{12}{100} \times a = \frac{3a}{25}$

SP including 8% VAT = $a + \frac{3a}{25} = \frac{28a}{25}$

As per question = $\frac{28a}{25} = 336$

$a = \frac{336 \times 25}{28}$

= **Rs. 300**

Trouser:

SP including VAT = Rs. 1100

VAT = 10%

Let SP without VAT = **a**

VAT = $\frac{10}{100} \times a = \frac{a}{10}$

SP including 8% VAT = $a + \frac{a}{10} = \frac{11a}{10}$

As per question = $\frac{11a}{10} = 1100$

$a = \frac{1100 \times 10}{11}$

= Rs. 1000

Original Price of shirt & trouser

= Rs 300 + Rs. 1000 = Rs. 1300

5. Jaya purchased a hair-dyer for Rs. 5400 including 8% VAT. Find price before VAT was added:

SP including VAT = Rs. 5400

VAT = 8%

Let SP without VAT = a

VAT = $\frac{8}{100} \times a = \frac{2a}{25}$

SP including 8% VAT = $a + \frac{2a}{25} = \frac{27a}{25}$

As per question $= \frac{27a}{25} = 5400$

$a = \frac{5400 \times 25}{27}$

$= \text{Rs. } 5000$

So, Price before VAT = Rs. 5000

6. Priya goes to a departmental store to buy a blanket, costing Rs. 2100. The rate of ST is 5%. She demanded manager to reduce price of blanket such that she has to pay same price including ST. Find reduction in price of blanket:

SP including 5% VAT = Rs. 2100

VAT = 5%

Let SP without VAT = a

VAT $= \frac{5}{100} \times a = \frac{a}{20}$

SP including 5% VAT $= a + \frac{a}{20}$

$= \frac{21a}{20}$

As per question $= \frac{21a}{20}$

$= 2100$

$a = \frac{2100 \times 20}{21}$

$= \text{Rs. } 2000$

Reduction in price of blanket required

$= \text{Rs. } 2100 - \text{Rs. } 2000 = \text{Rs. } 100$

7. A total bill for a machine is Rs. 2200. If shopkeeper charges 10%. What is list price of machine?

SP including 10% VAT = Rs. 2200

VAT = 10%

Let SP without VAT = a

VAT $= \frac{10}{100} \times a = \frac{a}{10}$

SP including 5% VAT $= a + \frac{a}{10} = \frac{11a}{10}$

As per question $= \frac{11a}{10} = 2200$

$a = \frac{2200 \times 10}{11}$

$= \text{Rs. } 2000$

List Price of Machine = **Rs. 2000**

Revision Exercise

1. Tick (✓) the correct option:

(a) (iii) 800 (b) (i) Rs. 1000

(c) (ii) Rs. 1000 (d) (i) 62/3%

2. (a) What percent of 48 m is 16 m?

$48 \times \frac{a}{100} = 16 \text{ m}$

$48a = 1600$

$a = \frac{1600}{48}$

$= \mathbf{33.33\%}$

(b) What percent of 1 kg is 40 g?

1 kg = 1000 g

$1000 \times \frac{a}{100} = 40 \text{ g}$

$1000a = 4000$

$a = \frac{4000}{1000}$

$= \mathbf{4\%}$

(c) What percent of 3.5 litres is 700 ml?

1 *l* = 1000 *ml*

3.5 *l* = 3.5 x 1000 = 3500 *ml*

$3500 \times \frac{a}{100} = 700 \text{ ml}$

$3500a = 70000$

$a = \frac{70000}{3500}$

$= \mathbf{20\%}$

3. Convert each of the following into a fraction:

(a) $6.25\% = \frac{6.25}{100} = \frac{625}{10000} = \frac{1}{16}$

(b) $0.9\% = \frac{0.9}{100} = \frac{9}{1000}$

(c) $0.08\% = \frac{0.08}{100} = \frac{8}{10000} = \frac{1}{1250}$

(d) $22.75\% = \frac{22.75}{100} = \frac{2275}{10000} = \frac{91}{400}$

4. According to a dishonest shopkeeper, he sells the items at his cost price but uses a false weight of 900 gm for each kilogram. Find his gain percent:

1kg = 1000 g

$900 \times \frac{a}{100} = 100 \text{ g}$

$900a = 10000$

$a = \frac{10000}{900} = \mathbf{\frac{100}{9}\%}$

5. Madan spends 20% of his salary on house rent and 70% of the remaining on household expenditure. If he saves Rs. 1800, what is his salary?

Let Salary be = a

House-rent $= \frac{20}{100} \times a = \frac{a}{5}$

Remaining Salary $= a - \frac{a}{5} = \frac{4a}{5}$

Household expenditure $= \frac{70}{100} \times \frac{4a}{5} = \frac{14a}{25}$

Remaining Salary $= \frac{4a}{5} - \frac{14a}{25} = \frac{6a}{25}$

As per question $= \frac{6a}{25} = 1800$

$\mathbf{a} = \frac{1800 \times 25}{6}$

$= Rs. 7500$

Madan's Salary = **Rs. 7500**

6. A chair is sold at Rs. 5,225 after allowing a discount of 5%. Find its marked price:

SP including 5% Discount = Rs. 5225

Discount = 5%

Let SP without Discount = a

Discount $= \frac{5}{100} \times a = \frac{a}{20}$

SP without 5% Discount $= a - \frac{a}{20} = \frac{19a}{20}$

As per question $= \frac{19a}{20} = 5225$

$a = \frac{5225 \times 20}{19}$

$= Rs. 5500$

Marked Price of Chair = **Rs. 5500**

7. A shopkeeper purchased 300 bulbs for Rs. 10 each. 20 bulbs got fused and were thrown away. He sold remaining bulbs at Rs. 15 each. Find his gain or loss percent:

CP of 300 bulbs @ Rs. 10 = Rs. 3000

CP of 20 bulbs @ Rs. 10 = (-) Rs. 200

CP of 280 bulbs @ Rs. 15 = Rs. 4200

Gain Amount = Rs. 4200 – 3000

= Rs. 1200

Gain % = Rs. $\frac{1200 \times 100}{3000}$

Profit (P%) $= \frac{1200}{30} = 40\%$

8. A laptop is sold at a gain of 16%. If it had been sold for Rs. 100 more, profit would have been 20%. Find cost price of the laptop:

Let CP of laptop be = a

Gain 16% = 16% of a

Gain amount $= \frac{16}{100} \times a = \frac{4a}{25}$

At Rs. 100 more, profit = 20% i.e. 4% more.

Gain 4% = 4% of a

Gain amount $= \frac{4}{100} \times a = \frac{a}{25}$

As per condition $= \frac{a}{25} = 100$

$= a = 100 \times 25$

$a = 2500$

Cost price of laptop (a) = Rs. 2500

9. Find selling price of an item if a profit of 5% is made on the item which is bought as Rs. 1150 with Rs. 50 as transportation charges:

CP of item = Rs. 1150 + Rs. 50 = Rs. 1200

Profit % = 5%

Profit amount $= \frac{1200 \times 5}{100}$

= Rs. 60

SP of item = Rs. 1200 + Rs. 60 = Rs. 1260

4. Complete the table:

	Fraction	Decimal	Percentage
a.	$\frac{2}{5}$	**0.40**	**40%**
b.	$\frac{12}{50}$	**0.24**	**24%**
c.	$\frac{7}{5}$	**1.20**	**140%**

Chapter – 9 Compound Interest

Exercise – 9.1

1. In the following situations, find simple interest and amount:

S.No.	Principal	Time	Rate per annum	Interest (Rs.)	Amount (Rs.)
a.	Rs. 20,000	6 Months	10% p.a.	**1000**	**21000**
b.	Rs. 800	2 years	4% p.a.	**64**	**864**
c.	Rs. 9500	5 years	9.5% p.a.	**4512.5**	**14012.5**
d.	Rs. 1600	**5 years**	5% p.a.	**400**	**Rs. 4000**

2. The interest on a sum is Rs. 1904 at the rate of 14% p.a. in 10 years. What is the sum and the amount?

$SI = \frac{PRT}{100}$

$1904 = P \times 14 \times 10$

$P = \frac{1904 \times 100}{14 \times 10}$? Rs. 1360

Sum = P = Rs. 1360

Amount A = P + SI = Rs. 1360 + 1904

= Rs. 3264

3. Find interest on a deposit of Rs. 7300 from May 2, 2017 to July 13, 2017 at the rate of 20% p.a. Also, find the amount:

Time = 72 days = $\frac{72}{365}$ days

$SI = \frac{PRT}{100} = \frac{7300 \times 20 \times 72}{100 \times 365}$

= Rs. 288

Amount A = P + SI = Rs. 7300 + 288

= Rs. 7588

4. A certain amount becomes Rs. 8325 in 4 years at the rate of 5.5% p.a. Find the interest:

P = Rs. a

A = Rs. 8325

T = 4 years

R = 5.5%

SI = A – P = Rs. (8325 – a)

$SI = \frac{PRT}{100}$

$8325 - a = \frac{a \times 5.5 \times 4}{100}$

$832500 - 100a = 22a$

$122a = 832500$

$a = \frac{832500}{122}$

P = 6845.90

SI = 8325 – 6845.90 = Rs. 1479.10

5. Priya gives an interest of Rs. 31.25 on sum of Rs. 5000. If the rate of interest is 25% p.a., find its time:

$SI = \frac{PRT}{100}$

$T = \frac{SI \times 100}{P \times R} = \frac{31.25 \times 100}{5000 \times 25} = \frac{1}{40}$ years

6. A certain amount becomes Rs. 641.25 in 146 days at the rate of 6.5% p.a. Find the sum and the interest:

P = Rs. a

A = Rs. 641.25

T = 146 days = 146/365 years

R = 6.5%

SI = A – P = Rs. (641.25 – a)

$SI = \frac{PRT}{100}$

$641.25 - a = \frac{a \times 146 \times 6.5}{100 \times 365}$

$64125 \times 365 - 36500a = 146 \times 6.5a$

$23405625 - 36500a = 949a$

$23405625 = 949a + 36500a = 37449a$

$a = 23405625 \div 37449$

a = Rs. 625

SI = 641.25 – 625

SI = Rs. 16.25

7. Find compound interest of Rs. 1000 for 2 years at 4% p.a.:

1st year Principal = Rs. 1000

Rate = 4%

Time = 1 year

$I = \frac{PRT}{100}$

$I = \frac{1000 \times 4 \times 1}{100}$

= Rs. 40

2^{nd} year Principal = Rs. 1040 (1000 + 40)

$I = \frac{1040 \times 4 \times 1}{100}$

= Rs. 41.60

Compound Interest at the end of 2nd year:

= Rs. 40 + 41.60

= Rs. 81.60

8. A sum of money becomes 3 times of itself in 10 years. In how many years will it become 10 times of itself?

Let P = 1

SI = 2

$1 \times 10 \times \frac{R}{100} = 2$

R = 20%

Now P = 1

SI = 9 (SI = A – P)

$1 \times 20\% \times T = 9$

$1 \times \frac{20}{100} \times T = 9$

Time (T) = $\frac{900}{20}$

Time= 45 years

9. Find compound interest when principal, = Rs. 2000, rate = 10% p.a. and time = 2 years:

1st year Principal = Rs. 2000

Rate = 10%

Time= 1 year

$I = \frac{PRT}{100}$

$I = \frac{2000 \times 10 \times 1}{100}$

= Rs. 200 (2000 + 200)

2nd year Principal = Rs. 2200

$I = \frac{2200 \times 10 \times 1}{100}$

= Rs. 220

Compound Interest at the end of 2nd year:

= Rs. 200 + 220

= Rs. 420

10. Manav borrowed Rs. 2000 at 5% p.a. compounded annually. When will be the amount payable at the end of 2 years?

1st year Principal = Rs. 2000

Rate = 5%

Time= 1 year

$I = \frac{PRT}{100}$

$I = \frac{2000 \times 5 \times 1}{100}$

= Rs. 100 (2000 + 100)

2nd year Principal = Rs. 2100

$I = \frac{2100 \times 5 \times 1}{100}$

= Rs. 105

Compound Interest at the end of 2nd year:

= Rs. 100 + 105

= Rs. 205

Amount payable at the end of 2 years:

= Rs. 2000 + 205

= Rs. 2205

11. Suresh borrowed a sum of Rs. 2000 from Central Bank to purchase a knitting machine. If rate of interest is 5% p.a. Calculate compound interest that Suresh has to pay to Bank after 3 years:

1st year Principal = Rs. 2000

Rate = 5%

Time= 1 year

$I = \frac{PRT}{100}$

$I = \frac{2000 \times 5 \times 1}{100}$

= Rs. 100 (2000 + 100)

2nd year Principal = Rs. 2100

$I = \frac{2100 \times 5 \times 1}{100}$

= Rs. 105

3rd year Principal = Rs. 2100 (2100 + 105)

$I = \frac{2205 \times 5 \times 1}{100}$

= Rs. 110.25

Compound Interest at the end of 2nd year:

= Rs. 100 + 105 + 110.25

= Rs. 315.25

Exercise – 9.2

1. In the following cases, find the amount and compound interest (interest compounded annually):

S.No.	Principal	Rate per annum	Time
a.	Rs. 4500	5% p.a.	3 yrs
b.	Rs. 5000	10% p.a.	2 yrs
c.	Rs. 100	4% p.a.	1 yr
d.	Rs. 3600	10% p.a.	2 yrs

a) 1st year: P = 4500 Rate 5%

Time 3 yrs

$I = \frac{PRT}{100} = \frac{4500 \times 5 \times 1}{100}$

I = Rs. 225

2^{nd} year P = Rs. 4725 (4500+ 225)

$I = \frac{4725 \times 5 \times 1}{100}$

I = Rs. 236.25

3^{rd} year P = Rs. 4961.25 (4725 + 236.25)

$I = \frac{4961.25 \times 5 \times 1}{100}$

= Rs. 248.06

Compound Interest at the end of 3^{rd} year:

= Rs. 225 + 236.25 + 248.06

= Rs. **709.31**

Amount = Rs. **5209.31** (4500 + 709.31)

b) 1^{st} year: P = Rs. 5000 Rate 10%
Time 2 yrs

$I = \frac{PRT}{100} = \frac{5000 \times 10 \times 1}{100}$

I = Rs. 500

2^{nd} year P = Rs. 5500 (5000 +500)

$I = \frac{5500 \times 10 \times 1}{100}$

I = Rs. 550

Compound Interest at the end of 2^{nd} year:

= Rs. 500 + 550

= Rs. **1050**

Amount = Rs. **6050** (5500 + 550)

c) 1^{st} year: P = Rs. 100 Rate 4%
Time 1 yr

$I = \frac{PRT}{100} = \frac{100 \times 4 \times 1}{100}$

I = Rs. 4

Compound Interest at the end of 1^{st} year:

= Rs. **4**

Amount = Rs. **104**

d) 1^{st} year: P = Rs. 3600 Rate 10%
Time 2yrs

$I = \frac{PRT}{100} = \frac{3600 \times 10 \times 1}{100}$

I = Rs. 396

Compound Interest at the end of 2nd year:

= Rs. 360 + 396

= Rs. 756

Amount = Rs. 4356 (3600 + 756)

2. Naman borrowed Rs. 8200 from a financing company for 2 years at 5% p.a. Calculate the compound interest payable at the end of the term.

1st year: P = Rs. 8200 Rate 5% Time 2 yrS

$I = \frac{PRT}{100} = \frac{8200 \times 5 \times 1}{100}$

I = Rs. 410

2^{nd} year P = Rs. 8610 (8200 + 410)

$I = \frac{8610 \times 5 \times 1}{100}$

I = Rs. 430.50

Compound Interest a the end of 2nd year:

= Rs. 410 + 430.50

= Rs. 840.50

3. Lalit gets a loan of Rs. 64,000 against his fixed deposits. If the rate of interest be 2.5 paise per rupee per p.a., calculate the compound interest payable after 3 years:

1st year: P = Rs. 64,000 Rate 2.5% Time 3 yrs

$I = \frac{PRT}{100} = \frac{64{,}000 \times 2.5 \times 1}{100}$

I = Rs. 1600

2^{nd} year P = Rs. 65600 (64,000 + 1600)

$I = \frac{65600 \times 2.5 \times 1}{100}$

I = Rs. 1640

3^{rd} year P = Rs. (65600 + 1640)

$I = \frac{67240 \times 2.5 \times 1}{100}$

= Rs. 1681

Compound Interest at the end of 2nd year:

= Rs. 1600 + 1640 + 1681

= Rs. 4921

4. Ritika borrowed Rs. 26,400 from a Bank to buy a TV @ 15% p.a. compounded yearly. What amount will she pay at end of 2 years and 4 months?

1st year: P = Rs. 26,400 Rate 15%
Time 2 yrs 4 months

$I = \frac{PRT}{100} = \frac{26,400 \times 15 \times 1}{100}$

I = Rs. 3960

2^{nd} year P = Rs. 30,360 (26400 + 3960)

$I = \frac{30360 \times 15 \times 1}{100}$

I = Rs. 4554

3^{rd} year P = Rs. 34,914 (30360+ 4554)

$I = \frac{34914 \times 15 \times 4}{100 \times 12}$

= Rs. 1745.70

Amount = Rs. 36,659.70

(34914 + 1745.70)

5. Using formula for compound interest, calculate the amount:

a) Principal = Rs. 4,000, Rate = 5%,
Time = 2 years

1^{st} year:

$I = \frac{PRT}{100} = \frac{4000 \text{ x } 5 \text{ x } 1}{100}$

I = Rs. 200

2^{nd} year P = Rs. 4200 (4000 + 200)

$I = \frac{4200 \text{ x } 5 \text{ x } 1}{100}$

I = Rs. 210

Compound Interest at the end of 2nd year:

= Rs. 200 + 210

= Rs. 410

Amount = Rs. 4410 (4,000 + 410)

b) Principal = Rs. 5,000, Rate = 8%,
Time = 3 years

1st year: P = Rs. 5000, Rate = 8%, Time = 3 years

$I = \frac{PRT}{100} = \frac{5000 \times 8 \times 1}{100}$

I = Rs. 400

2^{nd} year P = Rs. 5400 (5000 + 400)

$I = \frac{5400 \times 8 \times 1}{100}$

I = Rs. 432

3^{rd} year P = Rs. 5832 (5400 + 432)

$I = \frac{5832 \times 8 \times 1}{100}$

I = Rs. 466.56

Compound Interest at the end of 3rd year:

= Rs. 400 + 432 + 466.32

= Rs. 1298.32

Amount = Rs. 6,298.32 (5,000 + 832)

6. Siya and Tanya lent Rs. 70,000 and Rs. 60,000 for 3 years. Siya gets simple interest @ 10% p.a. while Tanya gets compound interest @ 8% p.a. compounded annually. Who received more interest and by how much?

a) Siya:

P = Rs. 70,000, Rate = 10%, Time = 3 years

$I = \frac{PRT}{100} = \frac{70,000 \times 10 \times 3}{100}$

I = Rs. **21000**

b)

Tanya:

1^{st} year: P = Rs. 60,000, Rate = 5%,
Time = 2 years

$I = \frac{PRT}{100} = \frac{60,000 \times 8 \times 1}{100}$

I = Rs. 4800

(60,000 + 4800)

2^{nd} year P = Rs. 64,800

$I = \frac{64,800 \times 8 \times 1}{100}$

I = Rs. 5184

(64,800+ 5184)

3^{rd} year P = Rs. 69,984

$I = \frac{69,984 \times 8 \times 1}{100}$

= Rs. 5598.72

Compound Interest at the end of 3^{rd} year:

= Rs. 4800+5184+5598.72

= Rs. 15,582.72

Siya got more interest by = Rs. 5417.28.

(21000 - 15582.72)

7. Find amount on Rs. 14,000 for 2 years compounded annually if rate of interest is 20% p.a. for the 1st year and 10% p.a. for the 2nd year:

1st year: P = Rs. 14,000, Rate 20%

$I = \frac{PRT}{100} = \frac{14,000 \times 20 \times 1}{100}$

I = Rs. 2800

2nd year: P = Rs. 16,800 (14000 + 2800), Rate 10%

$$I = \frac{16800 \times 10 \times 1}{100}$$

I = Rs. 1680

Compound Interest at the end of 2nd year:

= Rs. 2800 + 1680

= Rs. 4,480

Amount = Rs. 18,480 (14,000 + 4,480)

8. Pooja deposited Rs. 6,000 in a Bank which pays interest @ 10% p.a. compounded quarterly. Find interest due to Pooja after 1 year:

P = Rs. 6000 r = 10% p.a. n = 4/4 = 1

$$\text{Amount (A)} = P\left(1 + \frac{10}{100}\right)^n$$

$$= 6000\left(1 + \frac{10}{100}\right)$$

$$= 6000 \times \frac{110}{100}$$

= Rs. 6600

Interest = A – P = Rs. 6600 – 6000

= Rs. 600

9. Jagat bought a car for 3,50,000 on credit. The rate of interest for 1st year is 10% and for 2nd year is 5% and for 3rd year is again 5%. How much will it cost him if he pays amount after 3 years?

P = Rs. 350,000 $r_1 = 10\%$ $r_2 = 5\%$ $r_3 = 5\%$

So, Amount (A) after 3 years =

$$= 350{,}000\left[1 + \frac{r_1}{100}\right]\left[1 + \frac{r_2}{100}\right]\left[1 + \frac{r_3}{100}\right]$$

$$= 350{,}000\left[\frac{110}{100}\right]\left[\frac{105}{100}\right]\left[\frac{105}{100}\right]$$

= Rs. 424462.50

10. Find compound interest on Rs. 5,000 for 6 months at 20% p.a., if interest compounded quarterly:

P = Rs. 5,000 r = 20% p.a. quarterly 5% n = 2

$$\text{Amount (A)} = P\left[1 + \frac{5}{100}\right]^2$$

$$= 5000\left[\frac{105}{100}\right]^2$$

$$= 5000\,(1.05)^2$$

= Rs. 5512.50

Compound Interest = A – P = Rs. 5512.50 – 5000

= Rs. 512.50

11. Find amount on Rs. 4,096 for 18 months at 12½% p.a., the interest compounded semi-quarterly.

P = Rs. 4096 r = 12.5% p.a.

semi-quarterly 1.563% n = 12

$$\text{Amount (A)} = P\left(1 + \frac{1.563}{100}\right)^{12}$$

$$= 4096\left(1 + \frac{1.563}{100}\right)^{12}$$

$$\frac{A}{4096} = \frac{(101.563)^{12}}{100^8}$$

$$\frac{A}{(2)^{12}} = \frac{(101.563)^{12}}{100^{12}}$$

$$\sqrt[12]{A} = \frac{(101.563)}{100}$$

$$\sqrt[12]{A} = \frac{2 \times 101.563}{100}$$

$$A = (2.03)^{12}$$

Amount (A) = Rs. 4926

12. Ramlal bought a colour TV set on credit. It costs Rs. 2400 and dealer charges interest @ 20% p.a. Calculate the compound interest that Ramlal will have to pay after 3 years:

P = Rs. 2400 r = 20% p.a.

$$\text{Amount (A)} = P\left(1 + \frac{20}{100}\right)^3$$

$$= 2400\left(\frac{120}{100}\right)^3$$

$$= 2400 \times \frac{120}{100} \times \frac{120}{100} \times \frac{120}{100}$$

= Rs. 4147.20

Compound Interest = A – P = Rs. 4147.20 – 2400

= Rs. 1747.20

Exercise – 9.3

1. Find compound interest on Rs. 4000 for 1½ years at 5% p.a. compounded half-yearly.

P = Rs. 4000 r = 5% p.a. r/2 = 2.5%

half yearly n = 1½ = 3

$$\text{Amount (A)} = 4000\left(1+\frac{2.5}{100}\right)^3$$

$$= 4000\left(\frac{102.5}{100}\right)^3$$

$$= 4000 \times \frac{102.5}{100} \times \frac{102.5}{100} \times \frac{102.5}{100}$$

$$= \text{Rs. } 4307.56$$

Compound Interest = A – P = Rs. 4307.56 – 4000 = Rs. 307.56

2. Compute compound interest on Rs. 10,000 for one year at 6% p.a., if the interest is compounded half-yearly:

P = Rs. 10000, r = 6% p.a., r/2 = 3% half yearly.

n = 1 yr = 2

$$\text{Amount (A)} = 10000\left(1+\frac{3}{100}\right)^2$$

$$= 10000\left(\frac{103}{100}\right)^2$$

$$= 10000 \times \frac{103}{100} \times \frac{103}{100}$$

$$= \text{Rs. } 10{,}609$$

Compound Interest = A – P = Rs. 10,609 – 10,000 = Rs. 609

3. Find compound interest on Rs. 2560 for one year at 12½% p.a. compounded yearly:

P = Rs. 2560, r = 12.5% p.a., n = 1

$$\text{Amount (A)} = 2560\left(1+\frac{12.5}{100}\right)$$

$$= 2560\left(\frac{112.5}{100}\right)$$

$$= 2560 \times \frac{112.5}{100}$$

$$= \text{Rs. } 2880$$

Compound Interest = A – P = Rs. 2880 – 2560 = Rs. 320

4. Supriya lent Rs. 500 to Kavya to buy a pair of sandals at 10% p.a. If interest is compounded semi-annually, find interest paid by Kavya after one year:

P = Rs. 500, r = 10% p.a., r/2 = 5% half yearly

n = 1 yr = 2

$$\text{Amount (A)} = 500\left(1+\frac{5}{100}\right)^2$$

$$= 500\left(\frac{105}{100}\right)^2$$

$$= 500 \times \frac{105}{100} \times \frac{105}{100}$$

$$= \text{Rs. } 551.25$$

Compound Interest = A – P = Rs. 551.25 – 500 = Rs. 51.25

Exercise – 9.4

1. In what time, compound interest on Rs. 10,000 @ 6% becomes Rs. 10,404 p.a. when interest is compounded quarterly?

P = Rs. 10,000, Amount (A) = 10,404, r = 6% p.a. qtrly = 1.5%

$$\text{Amount (A)} = P\left[1+\frac{r}{100}\right]^{4n}$$

$$10{,}404 = 10{,}000\left[1+\frac{1.5}{100}\right]^{4n}$$

$$10{,}404 = 10{,}000\left[\frac{101.5}{100}\right]^{4n}$$

$$\frac{10{,}404}{10{,}000} = \left[\frac{1015}{1000}\right]^{4n}$$

$$\left[\frac{102}{100}\right]^2 = \left[\frac{1015}{1000}\right]^{4n}$$

$$2 = 4n$$

$$n = 1/2 \text{ year}$$

2. Find sum which amounts to Rs. 40,000 in 2 years @ 3½% compounded annually:

$$40000 = P\left[1+\frac{3.5}{100}\right]^2$$

$$40000 = P\left[\frac{103.5}{100}\right]^2$$

$$40000 = P \times 1.07$$

$$P = \frac{40000}{1.07}$$

$$P = 37{,}383$$

3. In what time, will Rs. 10,000 become Rs. 13,689 at 34% p.a. interest is compounded half-yearly?

$$13{,}689 = 10{,}000\left[1 + \frac{17}{100}\right]^{2n}$$

$$13{,}689 = 10{,}000\left[\frac{117}{100}\right]^{2n}$$

$$\frac{13{,}689}{10000} = \left[\frac{117}{100}\right]^{2n}$$

$$\left[\frac{117}{100}\right]^2 = \left[\frac{117}{100}\right]^{2n}$$

$$2n = 2$$

$$n = 1 \text{ year}$$

4. Find rate of interest at which a sum of money will be 6 times itself in 3 years, if interest is compounded annually:

(In the question, 6 times must be 8 times)

Let P = 1

Amount = 8

$$8 = 1\left[1 + \frac{R}{100}\right]^3$$

$$R = 100\%$$

5. Mona borrowed Rs. 5,000 from Bank. She will have to pay Rs. 15,000 after 2 years. Find rate of interest if interest is payable half-yearly. (Take $\sqrt{3} = 1.73$):

Ans: (This question seems to be wrong)

6. Find rate of interest p.a. if Rs. 2,000 amounts to Rs. 2662 in 1½ years, interest is compounded half-yearly:

P = Rs. 2,000, Amount (A) = 2,662, r = ? p.a. n = 3

$$\text{Amount (A)} = P\left[1 + \frac{r}{200}\right]^n$$

$$2662 = 2000\left[1 + \frac{r}{200}\right]^3$$

$$\frac{2662}{2000} = \left[\frac{200 + r}{200}\right]^3$$

$$\left[\frac{11}{10}\right]^3 = \left[\frac{200 + r}{200}\right]^3$$

$$\frac{11}{10} = \frac{200 + r}{200}$$

$$2000 + 10r = 200 \times 11$$

$$r = \frac{200}{10}$$

$$\mathbf{r = 20\%}$$

7. What sum, invested for 1½ years compounded half-yearly @ 8% p.a., amounts to Rs. 25,000:

P = Rs. ?, Amount (A) = 25,000, r = 8%, half yearly = 4%. n = 3

$$25000 = P\left[1 + \frac{4}{100}\right]^3$$

$$25000 = P\left[\frac{100 + 4}{100}\right]^3$$

$$25000 = P\left[\frac{104}{100}\right]^3$$

$$25000 = P\,(1.04)^3$$

$$P = \frac{25000}{(1.04)^3}$$

$$P = \text{Rs. } 22224.909$$

8. Calculate time when Rs. 1600 amounts to Rs. 1681 at 5% p.a. compounded semi-annually:

P = Rs. 1600, Amount (A) = 1681, r = 5%, h/y = 2.5%. n = 2

$$1681 = 1600\left[1 + \frac{2.5}{100}\right]^n$$

$$\frac{1681}{1600} = \left[\frac{102.5}{100}\right]^n$$

$$\left[\frac{41}{40}\right]^2 = \left[\frac{102.5}{100}\right]^n$$

n = 2 half years

n = 1 year

9. Compute principal, if compound interest compounded annually @ 20% p.a. for 2 years is Rs. 660:

P = Rs. ?, Amount (A) = 660, r = 20%, n = 2

$$A = P\left[1+\frac{r}{100}\right]^n$$

$$660 = P\left[1+\frac{20}{100}\right]^2$$

$$660 = P\left[\frac{120}{100}\right]^2$$

$$660 = P\left[\frac{12}{10}\right]^2$$

$$\frac{660}{P} = \frac{144}{100}$$

$$P = \frac{660 \times 100}{144}$$

P = Rs. 458.33

10. The difference between compound interest and simple interest on a sum of money at 10% per annum for 2 years is Rs. 500. Find sum if interest is compounded annually:

$$P = \text{Diff}\left[\frac{100}{R}\right]^2 \quad \text{(in case of 2 yrs)}$$

$$P = 500\left[\frac{100}{10}\right]^2$$

P = 500 × 100

= Rs. 50,000

11. Manish invested Rs. 36,000 at 5% p.a. compound interest. He received an amount of Rs. 39,690 after n years. Find value of n:

P = Rs. 36000, Amount (A) = 39690, r = 5%, n = ?

$$A = P\left[1+\frac{r}{100}\right]^n$$

$$39690 = 36000\left[\frac{100+5}{100}\right]^n$$

$$\frac{39690}{36000} = \left[\frac{105}{100}\right]^n$$

$$\frac{3969}{3600} = \left[\frac{105}{100}\right]^n$$

$$\left[\frac{63}{60}\right]^2 = \left[\frac{105}{100}\right]^n$$

n = 2 years

Revision Exercise

1. Tick (✓) the correct option:

(a) (iii) 630 (b) (ii) 1298.56

(c) (ii) 4017 (d) (iv) None

2. Complete the simple interest and the amount in the following cases:

S. No.	Principal	Rate p.a.	Time	S.I.	Amount
a.	Rs. 160	10%	½ years	Rs. 8	Rs. 168
b.	Rs. 4,750	-	2 years	Rs. 1187.50	Rs. 5937.50
c.	Rs. 8,500	-	1 year	Rs. 772.50	Rs. 9222.50
d.	Rs. 800	-	2 4 years	Rs. 112	Rs. 912
e.	Rs. 9,600	-	3 months	Rs. 192	Rs. 9792

2. Madan borrowed Rs. 25,000 from a finance company at 10% p.a., compounded half yearly. What amount of money will discharge his debt after 1½ years?

P = Rs. 25,000 r = 10% p.a., r/2 = 5% h/yrly,

n = 1½ yrs = 3

$$\text{Amount (A)} = P\left[1+\frac{r}{100}\right]^n$$

$$= 25000\left[1+\frac{5}{100}\right]^3$$

$$= 25000\left[\frac{105}{100}\right]^3$$

$$= 25000\left[\frac{21}{20}\right]^3$$

= Rs. 28940

4. Ranjan invested a sum of Rs. 12,000 at 5% p.a. compound interest. After how much time will he receive an amount of Rs. 13,230?

P = Rs. 12000, Amount (A) = 13230, r = 5%, n = ?

$$13230 = 12000\left[1+\frac{5}{100}\right]^n$$

$$\frac{13230}{12000} = \left[\frac{105}{100}\right]^n$$

$$\frac{1323}{1200} = \left[\frac{21}{20}\right]^n$$

$$\frac{441}{400} = \left[\frac{21}{20}\right]^n$$

$$\left[\frac{21}{20}\right]^2 = \left[\frac{21}{20}\right]^n$$

$$n = 2 \text{ years}$$

5. A sum of money amounts to Rs. 10240 in 2 years at 62/3% p.a., compounded annually. Find the sum.

P = Rs. ?, Amount (A) = 10,240, r = 62/3% (6.67%, n = 2

$$10,240 = P\left[1+\frac{6.67}{100}\right]^2$$

$$\frac{10,240}{P} = \left[\frac{106.67}{100}\right]^2$$

$$\frac{10,240}{P} = (1.0667)^2$$

$$P = \frac{10,240}{(1.0667)^2}$$

P = Rs. 9000

Chapter –10 Direct and Inverse Variation

Exercise – 10.1

1. Identify those in which x and y vary directly with respect to each other:

(a)

x	6	7	11	19	48
y	30	35	55	95	240

2. 13 men can dig 104 m long trench in one day. How many men should be employed for digging 225 m trench in one day?

Men	13	a
Trench (m)	104	225

$$\frac{13}{104} = \frac{a}{225}$$

$$a \times 104 = 13 \times 225$$

$$a = \frac{13 \times 225}{104}$$

$$= 28 \text{ men}$$

3. The length of pole which is 72 m high, casts a shadow of 80 m at a particular time on a day. Find height of an electric pole which casts a shadow of 10 m under similar conditions:

Height (m)	72	a
Shadow (m)	80	10

$$\frac{72}{a} = \frac{80}{10}$$

$$a \times 80 = 72 \times 10$$

$$a = \frac{72 \times 10}{80}$$

$$a = 9 \text{ m}$$

4. A labourer is paid Rs. 806 for 13 days of work. If he receives Rs. 1798, how many days did he work?

Days	13	a
Rs.	806	1798

$$\frac{13}{806} = \frac{a}{1798}$$

$$a \times 806 = 13 \times 1798$$

$$a = \frac{13 \times 1798}{806}$$

$$a = 2 \text{ days}$$

5. In a nursing home, monthly consumption of milk for 60 patients is 1350 l. How many patients can be accommodated in hospital if monthly consumption of milk is raised to 1710 l, assuming that quota per head remains same?

Patients	60	a
Qty. (*l*)	1350	1710

$$\frac{60}{a} = \frac{1350}{1710}$$

$a \times 1350 = 60 \times 1710$

$a = \frac{60 \times 1710}{1350}$

$a = 76$ patients

Exercise – 10.2

1. A man has money to buy 25 chairs worth Rs. 500 each. How many chairs he will be able to buy if each chair is costing Rs. 125 more?

Chairs (a)	25	a
Rs. (b)	500	625

$a_1b_1 = a_2b_2$

$25 \times 500 = a \times 625$

$a = \frac{25 \times 500}{625}$

$a = 20$ chairs

2. 2 trains cover a distance between 2 stations A and B. 1st train moves at an average speed of 54 km/h and 2nd train at 60 km/h. If 1st train takes 10 hrs to complete journey, how long will 2nd train take?

Speed (a)	54 km/hr	60 km/hr
Time (b)	10 hrs	b_2

$a_1b_1 = a_2b_2$

$54 \times 10 = 60 \times b_2$

$b_2 = \frac{54 \times 10}{60}$

$a = 9$ hours

3. Jatin has enough money to buy 75 books worth Rs. 200 each. How many books he can buy if he gets a discount of Rs. 50 on each book?

Rs. (a)	200	150
Books (b)	75	b_2

$a_1b_1 = a_2b_2$

$200 \times 75 = 150 \times b_2$

$b_2 = \frac{75 \times 200}{150}$

$a = 100$ books

4. If 30 labourers working 7 hrs a day can finish a piece of work in 18 days, how many labourers working 6 hrs a day can finish it in 30 days?

Labourers	Hours	Days
30	7	18
a	6	30

$a = \frac{30 \times 7 \times 18}{6 \times 30}$

$a = 21$ days

5. A water tanker can be filled in 8 hrs by 4 equal pumps. How many such pumps are needed if water tank is to be filled in $5^{1/3}$ hrs?

Hours (a)	8	5.2
Pumps (b)	4	b_2

$a_1b_1 = a_2b_2$

$8 \times 4 = 5.20 \times b_2$

$b_2 = \frac{8 \times 4}{5.2}$

$b_2 = 6$ pumps

6. 125 men have food provision for 160 days. How long will it last if number of men becomes 150?

Men	125	150
Days	160	a

$\frac{125}{150} = \frac{160}{a}$

$a = \frac{150 \times 160}{125}$

$a = 192$ days

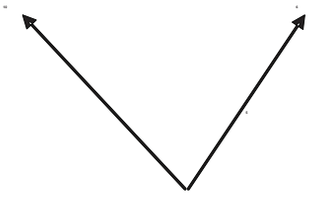
Exercise – 10.3

1. A and B can do a piece of work in 10 days and 6 days respectively. They work together for 2 days and B leaves work. In how many days A will finish remaining work?

		Days taken	Work Done
A	=	10	$1/10^{th}$
B	=	6	$1/6^{th}$

$$A + B = \frac{1}{10} + \frac{1}{6} = \frac{1+5}{30} = \frac{6}{30} = \frac{1}{5}$$

(A) (B))



(A+B) work together = 3 + 5 = 8

Worked together for 2 days = 8 × 2 = 16

Remaining work = 30 – 16 = 14

A's work after B's leaving $= \frac{14}{3}$

$= 42/3$ days

2. If 12 men earn Rs. 420 in 7 days. What will 20 men earn in 6 days?

Men	Earning	Days
12	420	7
20	a	6

$$a = \frac{420 \times 6 \times 20}{12 \times 7}$$

= Rs. 600

3. A train travels 4500 km in 5 hrs. How much distance will it travel in 14 hrs?

Hours	5	14
Km	4500	a

$$\frac{5}{14} = \frac{4500}{a}$$

$$a = \frac{4500 \times 14}{5}$$

$$= \frac{63000}{5} = 12600$$

a = 12,600 km

4. If 56 people can finish a job in 40 days. How many people can do it in 14 days?

People	56	a
Days	40	14

$a_1b_1 = a_2b_2$

$56 \times 40 = a \times 14$

$$a = \frac{56 \times 40}{14}$$

a = 160 people

5. Mohini weaves 25 baskets in 70 days. In how many days will she weave 220 baskets?

Baskets	25	220
Days	70	a

$$\frac{25}{70} = \frac{220}{a}$$

$$a = \frac{220 \times 70}{25}$$

a = 616 days

6. Piyush can do a piece of work in 5 days and Soaib can do it in 7 days. How long will they take to finish the job, if they work together?

In 5 days, Piyush does work = 1

In 1 day, he does part of work = $1/5^{th}$

In 7 days, Soaib does work = 1

In 1 day, he does part of work = $1/7^{th}$

$$\text{Work done together} = \frac{1}{5} + \frac{1}{7} = \frac{7+5}{35}$$

$$= \mathbf{\frac{12}{35}}$$

7. Karim weaves 25 baskets in 49 days. How many baskets can he weave in 70 days?

Baskets	25	A
Days	49	70

$$\frac{25}{a} = \frac{a}{70}$$

$$a = \frac{25 \times 70}{49}$$

a = 36 baskets

8. 12 men do a piece of work in 25 days. In how many days 6 men can do it?

Men	12	6
Days	25	A

$\frac{12}{25} = \frac{6}{a}$

$a = \frac{25 \times 6}{12} = \frac{150}{12}$

$a = 12\frac{1}{2}$ days

9. M and N can finish a work in 15 days. N alone can do 3/5th work in 15 days. In how many days M can finish it alone?

M and N can finish in 15 days = 1 work

In 1 day, they do part of work = 1/15th

N can finish in 15 days = 3/5th work

In 1 day, N does part of work $= \frac{3}{5 \times 15}$

$= \frac{1}{25}$

Work done by M in 1 days $= \frac{1}{15} - \frac{1}{25}$

$= \frac{5 - 3}{75} = \frac{2}{75}$

Work done by M in 1 days $= \frac{75}{2}$

$= 37\frac{1}{2}$ days

Revision Exercise

1. Tick (✓) the correct option:

(a) (iii) 22 (b) (iii) Rs. 560

(c) (ii) 25 km

2. Rafat cycles to her school at an average speed of 12 km/hr and takes 20 minutes. If she wants to reach her school in 15 minutes, what should be her average speed?

Speed (km/hr) (a)	12	a
Time (min) (b)	20	15

Speed has to be more for time being less.

As per condition: $a_1b_1 = a_2b_2$

$12 \times 20 = a \times 15$

$a = \frac{12 \times 20}{15} = \frac{48}{3}$

$a = 16$ km/hr

3. 120 men had food provision for 200 days. After 5 days, 30 men left that place. How long will the remaining food last?

Food provision for 120 men = 200 days

After 5 days, food after 30 men left = 195 days

No. of men after 30 men left = 90 men

Men (a)	120	90
Days (b)	195	a

As per condition: $a_1b_1 = a_2b_2$

$90 \times a = 120 \times 195$

$a = \frac{120 \times 195}{90} = \frac{4 \times 95}{3}$

$a = 260$ days

4. A labourer is paid Rs. 600 for 8 days' work. If he works for 20 days, how much will he get?

Days (a)	8	20
Rs. (b)	600	a

As per condition:

$\frac{8}{20} = \frac{600}{a}$

$a \times 8 = \frac{20 \times 600}{8}$

$a =$ Rs. 1500

5. If a varies direct as b, then fill in blanks:

(a)

a	17	64
b	51	**512**

(b)

a	25	7
b	75	**21**

(c)

a	8	**18**
b	32	72

6. A shopkeeper has enough money to buy 52 books worth Rs. 525 each. If each book were to cost Rs. 21 more, how many books would he be able to buy with that money?

Rs. (a)	525	546
Books (b)	52	b_2

$a_1b_1 = a_2b_2$

$525 \times 52 = 546 \times b_2$

$b_2 = \frac{525 \times 52}{546}$

$a = 50$ books

7. If cost of 15 pens of the same value is Rs. 600, find the cost of:

(a) 30 pens

Rs. (a)	600	a_2
Books (b)	15	30

$\frac{600}{15} = \frac{a_2}{30}$

$a_2 = \frac{600 \times 30}{15}$

a = Rs. 1200

(b) 50 pens

Rs. (a)	600	a_2
Books (b)	15	50

$\frac{600}{15} = \frac{a_2}{50}$

$a_2 = \frac{600 \times 50}{15}$

a = Rs. 2000

8. A and B can do a piece of work in 10 days, B and C can do the same work together in 12 days, while A and C can do it together in 15 days. How long will each take to do it separately?

		Days taken	Work Done
A and B	=	10	$1/10^{th}$
B and C	=	12	$1/12^{th}$
A and C	=	15	$1/15^{th}$

$(A+B)+(B+C)+(C+D) = \frac{1}{10} + \frac{1}{12} + \frac{1}{15}$

$2(A+B+C) = \frac{6 + 5 + 4}{60}$

$= \frac{15}{60} = \mathbf{\frac{1}{4}}$

$(A+B+C) = \mathbf{\frac{1}{8}}$

(A+B) (B+C) (C+D)

1 day's work 10 12 15

LCM 6 5 4

Total work 60

$(A+B) + (B+C) + (C+D) = 6 + 5 + 4$

$2(A+B+C) = 15$

$(A+B+C) = \mathbf{\frac{15}{2}}$

$A + (5) = \frac{15}{2}$

$= \frac{15}{2} - 5 = \frac{15 - 10}{2} = \frac{5}{2}$

$A = 60 \times \frac{2}{5} =$ 24 days

$B + (4) = \frac{15}{2}$

$= \frac{15}{2} - 4 = \frac{15 - 8}{2} = \frac{7}{2}$

$B = 60 \times \frac{2}{7} = \frac{120}{7}$ days

$C + (6) = \frac{15}{2}$

$= \frac{15}{2} - 6 = \frac{15 - 12}{2} = \frac{3}{2}$

$C = 60 \times \frac{2}{3} =$ 40 days

So, A = 24 days, B = $\frac{120}{7}$ days, C = 40 days

9. Complete equivalent ratios:

(a) $\frac{1}{3} = \frac{2}{\mathbf{6}} = \frac{3}{\mathbf{9}} = \mathbf{\frac{4}{12}}$

(b) $\frac{11}{20} = \mathbf{\frac{44}{80}}$

(c) $\frac{3}{5} = \frac{6}{\mathbf{10}} = \frac{9}{\mathbf{15}} = \frac{\mathbf{12}}{20}$

(d) $\frac{13}{40} = \frac{39}{\mathbf{120}}$

(e) $\frac{2}{3} = \frac{\mathbf{4}}{6} = \frac{\mathbf{6}}{9} = \frac{8}{\mathbf{12}}$

(f) $\frac{5}{7} = \frac{\mathbf{20}}{28}$

Chapter –11 Understanding Quadrilateral

Exercise – 11.1

1. In the figure PQRS, name:

(a) ∠ABC, ∠BCD; ∠BCD ∠CDA

(b) AB, BC; BC, CD

(c) ∠ABC, ∠CDA; ∠BCD, ∠DAB

(d) AB, CD; BC, AD (e) AC, BD

(f) 4 pairs (g) 2 pairs

(h) 4 pairs (i) 2 pairs

2. In the following figure, the measure of the indicated angle is:

60°

3. The 4 angles of a quadrilateral are in the ratio of 4 : 5 : 6 : 9. Find the measure of each angle:

Let angles be 4a°, 5a°, 6a° and 9a°

Therefore, $4a° + 5a° + 6a° + 9a° = 360°$

$24a° = 360°$

$a° = \frac{360°}{24°}$

$a° = 15°$

1st Angle = $4a° = 4 \times 15 = 60°$

2nd Angle = $5a° = 5 \times 15 = 75°$

3rd Angle = $6a° = 6 \times 15 = 90°$

4th Angle = $9a° = 9 \times 15 = 145°$

4. The 3 angles of a quadrilateral are equal and the fourth angle is 60°. Find measure of each angle:

Let angle be a° and 3 angles are equal, 4th angle = 60°

Therefore, $a° + a° + a° + 60° = 360°$

$3a° + 60° = 360°$

$3a° - 60° = 360° - 60° = 300°$

$a° = \frac{300°}{3°}$

$a° = 100°$

1st Angle = $a° = 100°$

2nd Angle = $a° = 100°$

3rd Angle = $a° = 100°$

4th Angle = 60°

5. The 3 angles of a quadrilateral are 90° each. Find the fourth angle:

Let angle 4th angle be a°

Therefore, $90° + 90° + 90° + a° = 360°$

$a° + 270° = 360°$

$a° = 360° - 270°$

$a° = 90°$

So, 4th Angle = 90°

6. In the following figures, find the value of x:

(a) As per question:

$x° + 65° + 150° + 80° = 360°$

$x° + 295° = 360°$

$x° = 360° - 295°$

$x° = 65°$

(b) As per question:

$x° + 30° + 75° + 90° = 360°$

$x° + 195° = 360°$

$x° = 360° - 195°$

$x° = 165°$

(c) As per question:

$x° + 120° + 120° + 60° = 360°$

$x° + 300° = 360°$

$x° = 360° - 300°$

$x° = 60°$

(d) As per question:

$x° + 60° + 120° + 90° = 360°$

$x° + 270° = 360°$

$x° = 360° - 270°$

$x° = 90°$

7. The bisectors of ∠P and ∠Q of quadrilateral PQRS meet at a point M. If ∠R = 95° and ∠S = 310, find measure of ∠PMQ:

The measure of ∠PMQ will be 63°

Exercise – 11.2

1. In parallelogram ABCD, fill in the blanks given below:

(a) AD = BC

(b) AB = DC

(c) OA = OC

(d) $\angle A + \angle D = 180°$

(e) $\angle A = \angle C$

(f) $\angle D = \angle B$

2. The perimeter of a parallelogram is 300 m. One of its sides is 50 m more than its adjacent side. Find length of sides of parallelogram.

One of sides = a cm

Other side = a + 50 cm

Perimeter = 2(l + b) = 300 m

As per condition = 2(l + b)

= 2(a + (a+50) = 300 m

= 2a + 100 = 300 m

= 2a = 300 - 100

a = 100 m

So, one side = 100 m

Another side = 50 m

3. If one angle of a parallelogram is 60°, find all other angles of it:

Let PQRS be a parallelogram and $\angle P = 60°$

$\angle P + \angle Q = 180°$ (Co-interior angles)

$\angle 600 + \angle Q = 180°$

$\angle Q = 180° - 60° = 120°$

$\angle R = \angle P = 60°$ (Opposite angles are equal)

$\angle Q + \angle S = 120°$ (same as above)

4. The measures of two adjacent angles of a parallelogram are in the ratio of 3:2. Find measure of each angle of parallelogram.

Measures of 2 adjacent $\angle$s = 180°

(Co-interior angles)

So, 3a + 2a = 180°

5a = 180°

a = 180° ÷ 5

a = 36°

$\angle 3a = 3 \times 36° = 108°$

$\angle 2a = 2 \times 36° = 72°$

So, 1 pair of opposite angles = 72° each.

Other pair of opposite angles = 108° each.

5. The two adjacent sides of a parallelogram are 12 cm and 14 cm. Find its perimeter:

Let length be 14 cm and breadth be 12 cm

Perimeter = 2(l + b)

= 2(14 + 12)

= 2 × 26

= 52 cm

6. The length of a parallelogram is 15 cm. If the breadth is 2/5 of the length, find its perimeter.

Length = 15 cm

Breadth = 15× 2/5 = 30/5

Perimeter = 2(l + b)

$= 2\left[15 + \frac{30}{5}\right]$

$= 2 \times \frac{105}{5}$

= 42 cm

7. The ratio of two sides of a parallelogram is 4 : 7. If its perimeter is 44 cm. Find its dimensions.

Let sides be 4a and 7a

Perimeter = 2(l + b) = 44 cm

= 2(4a + 7a) = 44 cm

= 2 (11a) = 44 cm

= 22a = 44 cm

= a = 2 cm

Side 4a = 4 × 2 = 8 cm

Side 7a = 7 × 2 = 14 cm

8. Find values of x, y and z in the following figures. All are parallelograms.

a) In upper Δ, 90° + 30° + z° = 180°

z° = 180° – 120°

z° = 60°

y° = z° = 60° (Opposite angles)

x° = 30° = 30° (Opposite angles)

b) x° = 100° (Opposite angles)

In upper Δ, 100° + 30° + y° = 180°

y° = 180° – 130°

y° = 50°

z° = 50° (Opposite angles)

c) y° = 120° (Opposite angles)

Remaining angles = 360° – 240°

= 120°

x° = 120° ÷ 2

x° = 60°

z° = 180° – y°

z° = 180° – 120°

z° = 60°

d) x° = 90° (Right angle)

$x° + y° + 30° = 180°$

$90° + y° + 30° = 180°$

$y° = 180° - 120°$

$y° = 60°$

$z° = y° = 60°$ (opposite)

Exercise – 11.3

1. ABCD is a rectangle in which diagonals meet at P. If AP = 3x + 1 and DP = 4x – 1, find x.

AP = 3x + 1 and

DP = 4x – 1

As per properties of Rectangle;

AP = DP

$3x + 1 = 4x - 1$

$4x - 3x = 1 + 1$

$x = 2$

2. The diagonals of Rhombus are 6 cm and 8 cm. What is length of each side of Rhombus?

Right triangles of Rhombus of sides 6 cm and 8 cm will have one angle 90° and length = 4 cm, breadth = 3(half of diagonals).

Now, $4^2 + 3^2 = 5^2$

So, 1st side of triangle = 3 cm

2nd side of triangle = 4 cm

3rd side of triangle = 5 cm (Hypotenuse)

3rd side (Hypotenuse) is the side of Rhombus.

Since all sides of Rhombus are equal in measure, all 4 sides are of 5 cm each.

3. Find length of diagonal of a rectangle whose sides are 3 cm and 4 cm.

Diagonal of rectangle will form Right triangles of sides 3 cm and 4 cm and one angle of 90°,

So, $3^2 + 4^2 = 5^2$

Length of Diagonal = 5 cm (Hypotenuse)

4. PQRS is a Rhombus whose diagonals interset at O. If PQ = 10 cm and QS = 16 cm, find length of PR.

PQ = 10 cm

QS = 16 cm

Mid-point of QS = 8 cm

Side 8 cm and PQ (hypotenuse) will form right triangle.

So, $10^2 - 8^2 = (3\text{rd side})^2$

$100 - 64 = (3\text{rd side})^2$

$36 = (3\text{rd side})^2$

3rd side = $\sqrt{36}$

= 6 cm

Length of PR = Diagonal = 12 cm

5. Prove that diagonals of a rectangle are equal.

A rectangle is a parallelogram whose each angle is 90°. ABCD is a rectangle as AD||BC, AB||DC.

In ΔABC ΔBAD,

AD = BC (opp. Sides of rectangle are equal)

DAB = CBA = 90° (Each angle of rectangle is 90°)

AB = BA

ΔABC ≅ ΔBAD (By SAS Rule)

AC = BD

So, diagonals of a rectangle are equal.

6. ABCD is a Rhombus whose diagonals intersect at O:

(a) Yes (b) Yes

7. PQRS is kite in which ∠OQR = 15° and ORS = ∠40°. Find:

(a) ∠PQR = 30°

(b) ∠PSQ = 100°

(c) ∠QPS = 115°

Revision Exercise

1. Tick (✓) the correct option:

(a) (i) 45° (b) (ii) 25°

(c) (i) 10cm (d) (iv) 6.5 cm

2. Do it yourself.

3. Find the value of unknown angle:

(a) ∠x = 180° (b) ∠x = 130°

(c) ∠x = 40°

4. ABCD is a Rhombus and its diagonals intersect at M:

(a) Is ΔBMC ≅ ΔDMC? Yes, According to SAS Rule.

(b) Is ∠BCM = ∠DCM? Yes, According to SAS Rule.

5. In a parallelogram ABCD, the bisectors of ∠B and ∠C meet at P. Find ∠BPC.

90°

6. The 4 angles of quadrilateral are in ratio of 2 : 3 : 6 : 7. Find its angles.

$\angle 2a + \angle 3a + \angle 6a + \angle 7 = 360°$

$\angle 18a = 360°$

$a = \frac{360\cup}{18}$

$a = 20°$

$2a = 2 \times 20 = 40°$

$\angle 3a = 3 \times 20 = 60°$

$\angle 6a = 6 \times 20 = 120°$

$\angle 7a = 7 \times 20 = 140°$

7. ABC is a quadrilateral:

(a) DC, CB; CB, BA; BA, AC

(b) 4 pairs

(c) $\angle D, \angle B$

(d) AC

(e) $\angle D, \angle C$

(f) AB, BC, CD, DA

Chapter –12 Construction of Quadrilateral

Exercise – 12.1

Do it yourself.

Revision Exercise

Do it yourself.

Chapter –13 Visualizing Solid Shapes

Exercise – 13.1

Do it yourself.

Revision Exercise

Do it yourself.

Chapter –14 Area of Trapezium and Polygon

Exercise – 14.1

1. In trapezium PQRS, PQ | | RS. If PQ = 10 cm, RS = 16 cm and distance between parallel sides is 13 cm, find area of trapezium PQRS.

Given = PQ Side = 10 cm, Side RS = 16 cm, Height = 13 cm

Area of trapezium PQRS

$= \frac{1}{2} \times$ height $\times$ (Sum of parallel sides)

Area of trapezium PQRS $= \frac{1}{2} \times 13 \times (10 + 16)$

$= \frac{1}{2} \times 13 \times (26)$

$= 13 \times 13$

$= 169\ cm^2$

2. The parallel sides of trapezium are 24 cm and 14 cm and its non-parallel sides are 10 cm each. Find area of trapezium.

Trapezium = 1 Rectangle + 2 Right Δs

Right Δ sides: $h^2 = 10^2 - 5^2 = 100 - 25 = 75$;

$h = 5\sqrt{3}$

Area of 2 Right Δs $= 2(\frac{1}{2} \times$ base $\times$ height)

$= 2(\frac{1}{2} \times 5 \times 5\sqrt{3}) = 25\sqrt{3}$

Area of Rectangle $= l \times b$

$= 14 \times 5\sqrt{3}$

$= 70\sqrt{3}$

Area of Trapezium $= 95\sqrt{3}\ cm^2$

$[25\sqrt{3} + 70\sqrt{3}]$

3. The parallel sides of trapezium are 16 cm and 14 cm long and the distance between them is 20 cm. Find its area.

Given : Parallel sides = 16 cm, 14 cm,

Height = 20 cm

Area of trapezium

$= \frac{1}{2} \times$ height $\times$ (sum of parallel sides)

Area of trapezium $= \frac{1}{2} \times 20 \times (16 + 14)$

$= \frac{1}{2} \times 20 \times 30$

$= 10 \times 30$

$= 300\ cm^2$

4. One of parallel sides of trapezium is three times the other. The distance between them is 14 cm. If the area of trapezium is 84 sq. cm, what is the length of the parallel sides?

Let trapezium be = PQRS, One side PQ = x cm,

Side RS will be 3x cm

Area of trapezium PQRS = 84 cm^2, Height = 14 cm

Area of trapezium PQRS

$= \frac{1}{2} \times$ height $\times$ (Sum of parallel sides)

$84 = \frac{1}{2} \times 14 \times (x + 3x)$

$84 = 7 \times 4x$

$4x = \frac{84}{7}$

$x = \frac{12}{4}$

1st side PQ = x = 3 cm

2nd side RS = 3x = 9 cm

5. The shape of a table top is trapezium. Find its area if its parallel sides are 1 m and 2.5 m and perpendicular distance between them is 0.8m.

Let trapezium be = PQRS, One side PQ = 1 m,

Side RS will be 2.5 m

Height = 0.8 m

Area of trapezium PQRS

$= \frac{1}{2} \times$ height $\times$ (Sum of parallel sides)

$= \frac{1}{2} \times 0.8 \times (1 + 2.5)$

$= 0.4 \times 3.5$

$= 1.4\ m^2$

6. The diagonal of a quadrilateral is 20 cm. The lengths of perpendicular from other vertices on diagonal are 8 cm and 5 cm. Find area of quadrilateral.

Let quadrilateral be = PQRS, Diagonal = 20 cm,

Length of 1st perpendicular = 5 cm

Length of 2nd perpendicular = 8 cm

Area of quadrilateral

$= \frac{1}{2} \times$ (Sum of perpendiculars) $\times$ Diagonal

$= \frac{1}{2} \times (5 + 8) \times 20$

$= 13 \times 10$

$= 130\ cm^2$

7. The area of trapezium shaped garden is 480 sq. m, distance between 2 parallel sides is 15 m and one of parallel sides is 20 m. Find length of other parallel side.

Let trapezium be = PQRS, One side PQ = 20 m,

Another side RS will be x m

Area of trapezium PQRS = 480 m^2,

Height = 15 m

Area of trapezium PQRS

$= \frac{1}{2} \times$ height $\times$ (Sum of parallel sides)

$480 = \frac{1}{2} \times 15 \times (x + 20)$

$960 = 15\ (x + 20)$

$960 = 15x + 300$

$15x = 960 - 300 = 660$

$x = \frac{660}{15}$

$x = 44$ m

8. The area of a trapezium is 520 cm^2. Its parallel sides are in ratio of 5 : 8 and perpendicular distance between them is 6 cm. Find length of each parallel side.

Given = Ratio of parallel sides = 5 : 8

Area of trapezium = 520 cm^2

Height (Distance) = 6 cm

Length of parallel side = a (say)

Area of trapezium

$= \frac{1}{2} \times$ height $\times$ (Sum of parallel sides)

$520 = \frac{1}{2} \times 6 \times (5a + 8a)$

$1040 = 6(13a)$

$1040 = 78a$

$a = \frac{1040}{78}$

$a = 13.33$

Length of parallel side (5a) = 5×13.33

= 66.65 cm

Length of parallel side (8a) = 8×13.33

= 106.64 cm

Exercise – 14.2

1. Find area of rectangle whose length and breadth are as follows:

(a) 6 cm, 5.4 cm

Area of Rectangle = Length $\times$ Breadth

$= 6 \times 5.4$

$= 32.4\ cm^2$

(b) 7 cm, 6.3 cm

Area of Rectangle = Length $\times$ Breadth

$= 7 \times 6.3$

$= 44.1\ cm^2$

(c) 9 m, 5.3 m

Area of Rectangle = Length × Breadth

= 9 × 5.3

= 47.7 cm^2

2. Find area of squares whose sides are :

(a) 5.3 cm

Area of Square = side × side (or $side^2$)

= 5.3× 5.3

= 28.09 cm^2

(b) 4.8 cm

Area of Square = side × side (or $side^2$)

= 4.8 × 4.8

= 23.04 cm^2

(c) 7.5 cm

Area of Square = side × side (or $side^2$)

= 7.5 × 7.5

= 56.25 cm^2

3. Find side of a square having area 4900 sq. m.

Area of Square = side × side (or $side^2$)

Side of Square = $\sqrt{}$ Area

Side of Square = $\sqrt{}$ 4900

= 70 m

4. Find Area of a rectangular garden whose length is 0.3 m and breadth is 2cm.

Length of Rectangular Garden = 0.3 m

Breadth of Rectangular Garden = 2 cm = 0.02 m

Area of Rectangular Garden

= Length × Breadth

= 0.3 × 0.02

0.006 m^2

5. Find the area of a square whose side is 25 cm.

Area of Square = side × side (or $side^2$)

= 25 x 25

= 625 cm^2

6. The diagonals of a Rhombus are 14 cm and 18 cm. Find its area.

Area of Rhombus = $\frac{1}{2} \times d_1 \times d_2$

Area of Rhombus = $\frac{1}{2} \times 14 \times 18$

= 7 × 18

= 126 cm^2

7. The area of a rectangular field is 835 sq. m. One of its sides is 50 m. Find the other side.

Given: Area of Rectangle = 835 m^2

1st side say length = 50 m

2nd side say breadth = x m

Area of Rectangle = Length x Breadth

835 = 50 × x

$x = \frac{835}{50}$

= 16.7 m

8. Find the area of given shaded region:

(a) Outer Rectangle:

Length = 60 m

Breadth = 25 m

Area = Length × Breadth

= 60 × 25

= 1500 m^2

Inner Rectangle:

Length = 52 m [60 – (4 + 4)]

Breadth = 17 m [25 – (4 + 4)]

Area = Length × Breadth

= 52 × 17

= 884 m^2

Area of Shaded Region = Outer Area – Inner Area

= 1500 – 884

= 616 m^2

(b) Area of Rectangle:

Length = 30 m

Breadth = 17 m

Area = Length × Breadth

= 30 × 17

= 510 m^2

Area of 2 Right Triangles

= $2\left(\frac{1}{2} \times \text{base} \times \text{height}\right)$

= $2\left(\frac{1}{2} \times 2 \times 17\right)$

= 34 m^2

Area of Shaded Region

= Rectangle Area – Triangles Area

= 510 - 34 m^2

= 476 m^2

9. The area of an equilateral triangle is $49\sqrt{}3$ sq. m. Find length of its sides.

Area of Equilateral Triangle $= \frac{\sqrt{3}}{4} \times a^2$

$49\sqrt{3} = \frac{\sqrt{3}}{4} \times a^2$

or $49\sqrt{3} \times 4 = \sqrt{3} \times a^2$

or $a^2 = \frac{49\sqrt{3} \text{©} 4}{\sqrt{3}}$

or $a^2 = 49 \times 4 = 196$

or $a = \sqrt{196}$

$= 14$ m

Lengths of Equilateral Triangle= 14 m each

10. The side of an equilateral triangle is 36 cm. Find its area.

Area of Equilateral Triangle $= \frac{\sqrt{3}}{4} \times a^2$

$= \frac{\sqrt{3}}{4} \times 36 \times 36$

$= \sqrt{3} \times 9 \times 36$

$= 324\sqrt{3}$

Area of Equilateral Triangle $= 324\sqrt{3}$ m^2

11. The area of a parallelogram is 2000 sq. m. If one of its sides is 200 m, find distance of this side parallel to it.

Given: Parallelogram Area = 2000 sq. m.

One side (base) = 200 m

Area of Parallelogram = Base × Height

2000 = 200 × Height

Height $= \frac{2000}{200}$

$= 10$ m

Distance of side = 10 m

12. Find the area of an isosceles triangle whose base is 18 cm and one of its equal sides is 15 cm.

Given: Base of Isosceles Triangle = 18 cm

Length of equal sides = 15 cm

Base of one right triangle $= \frac{18}{2} = 9$ cm

Height of right triangle $= \sqrt{152 - 92}$

$= \sqrt{225 - 81} = \sqrt{144}$

$= 12$ cm

Area of Isosceles Triangle = 2 ×(2 right triangles)

$= 2\left(\frac{1}{2} \times 9 \times 12\right)$

$= 9 \times 12$

$= 108$ cm^2

Area of Isosceles Triangle = 108 cm^2

Revision Exercise

1. Tick (✓) the correct answer:

(a) (i) 4 times (b) (iv) None

(c) (iv) None (d) (iii) 5 cm

2. Find area of an equilateral triangle whose side is 25 cm.

Area of Equilateral Triangle $= \frac{\sqrt{3}}{4} \times a^2$

$= \frac{\sqrt{3}}{4} \times 25 \times 25$

$= 156.25\sqrt{3}$

Area of Equilateral Triangle $= 156.25\sqrt{3}$ cm^2

3. If the base and altitude of a triangle are doubled, what will happen to its area?

If base and altitude of a triangle are doubled, its area will increase by 4 times.

4. Find area of a quadrilateral, if length of one of its diagonals is 28 cm and perpendicular distances from other 2 vertices to this diagonal is 15 cm and 40 cm.

Area of quadrilateral

$= \frac{1}{2} \times$ (sum of 2 sides) × diagonal

$= \frac{1}{2} \times (15 + 40) \times 28$

$= 55 \times 14$

$= 770$ cm^2

Area of quadrilateral = 770 cm^2

5. Find area of following figures:

(a) (i) Area of Rectangle

= Length × Breadth

= 3×3.5 = 10.5cm^2

(ii) Area of Square = Side × Side

= 1.5×1.5 = 2.25cm^2

Area of figure = 10.5 + 2.25

= 12.75 cm^2

(b) Area of Upper half figure

= Area of 2 right Δs + rectangle

Area of 2 Right Triangle

= $2(\frac{1}{2} \times \text{base} \times \text{height})$

= $2(\frac{1}{2} \times 1 \times 3) = 3\ cm^2$

Area of Rectangle = Length x Breadth

= 4×3 = $12\ cm^2$

Total area of Upper half: = $12 + 3 = 15\ cm^2$

Area of Lower half figure = $15\ cm^2$ (Same as above)

Area of Upper + Lower = $15 + 15$

= $30\ cm^2$

(c) (i) Area of Rectangle = Length × Breadth

= 5×3 = $15\ cm^2$

(ii) Area of Semicircle = $\frac{\rho r^2}{2}$

= $\frac{3.14}{2} \times 1.5 \times 1.5$ = $3.5325\ cm^2$

Total area = $15 + 3.5325$

= $18.5325\ cm^2$

6. The area of trapezium is 600 m2. The perpendicular distance between 2 bases is 30 m. If the difference of length of its bases is 8 m. Find length of its bases.

Given = trapezium PQRS

Area of trapezium = 600 m2,

Height = 30 m

Length of 1st base = x

Length of 2nd base = x-8

Area of trapezium PQRS

= $\frac{1}{2}$ × height × (Sum of parallel sides)

$600 = \frac{1}{2} \times 30 \times (x + x - 8)$

$600 = 15\ (2x - 8)$

$2x - 8 = \frac{600}{15} = 40$

$2x = 40 + 8 = 48$

$x = 24$

Length of 1st base = x = 24 m

Length of 2nd base = x-8 = 16 m

7. The hypotenuse of a right triangle is 10 cm and one of its sides is 6 cm. What is its area?

Hypotenuse of right triangle = 10 cm

Let one side (base) be = 6 cm

Height of right triangle = $\sqrt{102 - 62}$

$= \sqrt{100 - 36} = \sqrt{64}$

= 8 cm

Area of Right Triangle = $(\frac{1}{2} \times 6 \times 8)$

= 3×8 = $24\ cm^2$

Area of Right Triangle = $24\ cm^2$

8. Find area of PQRS in which PR | |SR and PQ = 10 cm, SR = 40 cm and perpendicular RM = 41 cm.

Area of PQRS

= $\frac{1}{2}$ × (sum of 2 sides) × diagonal

= $\frac{1}{2} \times (10 + 40) \times 41$

= 25×41

= $1025\ cm^2$

Area of PQRS = $1025\ cm^2$

9. The area of an equilateral triangle is $36\sqrt{3}$ sq. cm. Find length of its each side.

Area of Equilateral Triangle = $\frac{\sqrt{3}}{4} \times a^2$

$36\sqrt{3} = \frac{\sqrt{3}}{4} \times a^2$

or $36\sqrt{3} \times 4 = \sqrt{3} \times a^2$

or $a^2 = \frac{36\sqrt{3} \copyright 4}{\sqrt{3}}$

or $a^2 = 36 \times 4 = 144$

or $a = \sqrt{144}$

= 12 m

Lengths of Equilateral Triangle = 12 m each

10. Find area of the shades region:

(a) (i) Area of Square = Side x side

= 2.5 x 2.5

= 6.25 cm2

(ii) Area of 4 half-semicircles

Radius of half-semicircle = 1.25 cm

Area of Circle = лr2

Area of semi-circle = $\frac{\rho r^2}{2}$

Area of half-semicircle $= \frac{\rho r^2}{4}$

$= \frac{3.14 \times 1.25 \times 1.25}{4}$

$= 1.23\ cm^2$

Area of 4 half-semicircles $= 4 \times 1.23\ cm^2$

$= 4.92\ cm^2$

Area of Shaded Region = Area of Square – Area of 4 half-semicircles

$= 6.25 - 4.92$

$= 1.33\ cm^2$

(b) (i) Shaded Trapezium Area

$= \frac{1}{2} \times h$ (sum of parallel sides)

$= \frac{1}{2} \times 4 \times (10 + 12)$

$= 2 \times 22 = 44\ m^2$

$= 25\ cm^2$

(ii) Shaded Rectangle Area

= Length × Breadth

$= 12 \times 5 = 60\ m^2$

(iii) Blank Rectangle Area

= Length x Breadth

$= 2 \times 1 = 2\ m^2$

Total Shaded Area = (i) + (ii) – (iii)

$= (44 + 60) - 2$

$= 102\ m^2$

11. A rectangular park 250 m long and 150 m wide has a path all around inside it, having width 4 cm. If there is a circular of radius 7 m in the middle of it, how much is there for gardening plants?

(i) Rectangle Park Area = Length × Breadth

$= 250 \times 150$

$= 37500\ m^2$

(ii) (a) Rectangle Path Area

= Length × Breadth

$= 250 \times 0.04 = 20\ m^2$

(b) Rectangle Path Area

= Length × Breadth

$= 149 \times 0.04 = 12\ m^2$

(iii) Circular Area = лr2

$= 3.14 \times 7 \times 7$

$= 154\ m^2$

Area covered = (a) + (b) + (iii)

$= 20 + 12 + 154 = 186\ m^2$

Area for gardening plants

= Rectangle Area - Covered Area

$= 37500\ m^2 - 186\ m^2$

$= 37314\ m^2$

Chapter–15 Surface Area and Volume of Solids

Exercise – 15.1

1. Name the faces, edges and the vertices of following cube and cuboid:

(a) Faces : KLMN, LNPQ, QPOR, KNOR, KLOP, MNOP

Edges : KL, NM, OP, RQ, KN, LM, QP, RO, KR, LQ, MP, NO

Vertices : K, L, M, N, Q, R, O,

(b) Faces : PQRS, SRUT, TSPW, QVWP, TWVU

Edges : PR, SR, TU, WV, SP, TW, QR, VU, PW, VQ, UR, TS

Vertices : P, Q, R, S, T, U, V, W

2. Find the surface area of following cubes:

(a) Length = 6 cm

Surface area of Cube = $6a^2$

$= 6 \times 6 \times 6$

$= 216\ cm^2$

(b) Length = 9 cm

Surface area of Cube = $6a^2$

$= 6 \times 9 \times 9$

$= 486\ cm^2$

3. Find the surface area of following cuboids:

(a) Length = 9 cm, breadth = 5 cm, height = 3 cm

Surface area of Cuboid = 2(lb + bh + hl)

$= 2(9 \times 5 + 5 \times 3 + 3 \times 9)$

$= 174\ cm^2$

(b) Length = 4 cm, breadth = 75 cm, height = 30 cm :

Surface area of Cuboid = 2(lb + bh + hl)

$= 2(4 \times 75 + 75 \times 30 + 30 \times 3)$

$= 5340\ cm^2$

4. 3 cubes of length 4 cm are joined end to end. Find surface area of cuboid so obtained.

Surface area of Cube = $6a^2$

Surface area of 3 Cubes joined together

= $2(lb + bh + hl)$

= $2(12\times4 + 4\times4 + 4\times12)$

= $224\ cm^2$

5. The length, breadth and height of a room is 12 m, 10 m and 8 m. Find cost of white washing its wall @ 75 per m^2 and cementing the floor @ 100 per m^2.

Surface area of Cuboid = $2h(l+b)$

= $2\times8(12+10)$

= $352\ m^2$

Cost of white washing = 352×75

= Rs. 26,400

Floor Area = Length × Breadth

= 12×10

= $120\ m^2$

Cost of cementing floor = 120×100

= Rs. 12,000

6. An open box is painted @ Rs. 50 per m^2. The dimensions of box are 50 cm by 20 cm by 10 cm. Find cost of its painting.

(Question seems to be incomplete and unclear)

7. A water tank is 12 m long, 8 m wide and 4 m deep and it is open. The top is to be made of iron sheet. Find cost of iron sheet @ Rs. 5 per metre if its width is 8m.

Length = 12 m

Width = 8 m

Area of Top = $l\times b$

= 12×8

= $96\ m^2$

Iron sheet's width = 8 m

Iron sheet is needed = 12 m (as per question)

Rate per metre = @ 5 per meter

Cost of Iron Sheet = 12×5

= Rs. 60

8. The length, breadth and height of a box are in ratio 3 : 2 : 1 and its surface area is 2662 m^2. Find its dimensions.

Surface area of Cuboid = $2(lb+bh+hl)$

$2662 = 2(3a\times2a + 2a\times a + a\times3a)$

$2662 = 2(6a^2 + 2a^2 + 3a^2)$

$2662 = 2(11a^2)$

$2662 = 22a^2$

$a^2 = \frac{2662}{22} = 121$

$a = \sqrt{121} = 11$

Length = $3a = 3\times11 = 33$ m

Breadth = $2a = 2\times11 = 22$ m

Height = $1a = 1\times11 = 11$ m

Exercise – 15.2

1. Find volume of cube whose side lengths are given below:

(a) Length = 16 cm

Volume of Cube = l^3

= $16\times16\times16$

= 4096 cm3

(b) Length = 30 m

Volume of Cube = l^3

= $30\times30\times30$

= 27000 m3

2. Find volume of cuboid whose dimensions are given below:

(a) Length = 4 cm, breadth = 3 cm, height = 5 cm.

Volume of Cuboid

= length × breadth × height

= $4\times3\times5$

= $60\ cm^3$

(b) Length = 6 dm, breadth = 3 dm, height = 9 cm (0.9 dm):

Volume of Cuboid

= length × breadth × height

= $6\times3\times0.9$

= $16.2\ dm^3$

3. Fill in the blanks:

(a) $7\ dm^3$ = 7 litre

(b) $4\ dm^3$ = 4,000 millilitre

(c) $10\ m^3$ = $10,000\ dm^3$

(d) 1000 *l* = $1\ m^3$

4. A rectangular water tank is 90 cm wide and 40 cm deep. If its capacity is 576 litre of water, find its length.

Length = a (say)

Breadth = 90 cm

Height = 40 cm

Volume = $576\ l = 576000\ cm^3$

Volume of Cuboid

= length × breadth × height

576000 = a × 90 × 40

$a = \frac{576000}{90 \times 40} = \frac{576000}{3600}$

= 160 cm

Length (a) = 160 cm

5. A godown is in the form of cuboid of measure 60 m × 40 m × 30 m. How many cubical boxes can be stored in it if side of 1 box is 10 m?

Volume of Cuboid = length × breadth × height

= 60 × 40 × 30

= 72,000 m3

Volume of 1 Cube = l3

= 10^3 = 1000 m^3

No. of Cubical boxes = $\frac{72,000}{1,000}$

= 72 boxes

No. of cubical boxes that can be stored = 72 boxes

6. The internal measures of a cuboidal room are 12 m × 8 m × 4 m. Find total cost of whitewashing all 4 walls, if cost of whitewashing is Rs. 15/m^2.

Area of 4 walls of Cuboid = 2h(1+b)

= 2(4)(12+8)

= 160 m^2

Rate of whitewashing = Rs. 15/m^2

Cost of whitewashing = 15 x 160

= Rs. 2400

7. 3 cubes of side 30 cm are joined end to end. Find volume of cuboid so formed.

Length of cube = 30 cm

Length of cuboid = 90 cm (3 × 30 cm)

Breadth of cuboid = 30 cm

Height of cuboid = 30 cm

Volume of Cuboid = length × breadth × height

= 90 × 30 × 30

= 81000 cm^3

Volume of Cuboid = 81000 cm^3

8. If each edge of a cube is doubled:

(a) How many times will its volume increase?

Volume of Cube = 1×1×1 = l3

If side is doubled, then

Volume of Cube will be = 2l × 2l × 2l = 8l3

So, Volume of Cube will increase by 8 times.

(b) How many times will its surface area increase?

Surface area of Cube = $6a^2$ = 6(a × a)

If side is doubled, then

surface area of Cube will be = 6(2a × 2a)

= $6(4a^2)$

So, surface area of Cube will increase by 4 times.

9. The volume of a box is 14400 cm^3 and its base area is 120 cm^2. Find its height.

Volume of Cuboid = [length x breadth] × height

14400 cm3 = [120 cm^2] × height

height = $\frac{14400\ cm^3}{120\ cm^2}$

= 120 cm

Height of box = 120 cm

10. A solid cube of edge 15 cm is melted into a cuboid of measures 25 cm by 9 cm. Find height of cuboid.

Volume of Cube = Volume of Cuboid

l3 = l × b × h

153 = 25 × 9 × h

15 × 15 × 15 = 25 × 9 × h

$h = \frac{15 \times 15 \times 15}{25 \times 9}$

= 15 cm

Height of cuboid = 15 cm

11. Which has greater volume – a box measuring 10 m by 5 cm by 2 cm or other box that measures 13 cm by 1 cm by 0.5 cm?

Volume of 1st box = l × b × h

= 1,000 cm × 5 cm × 2 cm

= 10,000 cm^3

Volume of 2nd box = l × b × h

= 13 cm × 1 cm × 0.5 cm

= 6.5 cm^3

Clearly, 1st box has greater volume.

12. Find volume of following objects, if volume of 1 cube is equal to 1 cm^3:

(a) 24 cm^3 (b) 32 cm^3

(c) 30 cm^3 (d) 36 cm^3

Exercise – 15.3

1. Find Curved Surface Area and Total Surface Area of following cylinder having dimensions given below:

(a) Diameter = 4.9 cm (2.45 cm),
Height = 8 cm

CSA of Cylinder = Rectangle Area = $l \times b$

$= 2\pi r \times h$

$= 2 \times 3.143 \times 2.45 \times 8$

$= 123.2\ cm^2$

TSA of Cylinder = $2\pi rh + 2\pi r^2 = 2\pi r(h + r)$

$= 2 \times 3.143 \times 2.45(8+2.45)$

$= 160.94\ cm^2$

(b) Radius = 42 cm, Height = 14 cm

CSA of Cylinder = Rectangle Area

$= l \times b = 2\pi r \times h$

$= 2 \times 3.143 \times 42 \times 14$

$= 3696\ cm^2$

TSA of Cylinder = $2\pi rh + 2\pi r^2$

$= 2\pi r(h + r)$

$= 2 \times 3.143 \times 42(14+42)$

$= 14{,}784\ cm^2$

(c) Radius = 10.5 cm, Height = 16 cm

CSA of Cylinder = Rectangle Area

$= l \times b = 2\pi r \times h$

$= 2 \times 3.143 \times 10.5 \times 16$

$= 1056\ cm^2$

TSA of Cylinder = $2\pi rh + 2\pi r^2$

$= 2\pi r(h + r)$

$= 2 \times 3.143 \times 10.5(16+10.5)$

$= 1749\ cm^2$

2. A metallic pipe has internal and external diameters 10 cm and 12 cm and its length is 4.2 m. Find its:

(a) Internal curved surface area

Diameter = 10 cm
Radius = 5 cm
Height (length) = 4.2 cm

CSA of Cylinder = Rectangle Area

$= l \times b = 2\pi r \times h$

$= 2 \times 3.143 \times 5 \times 4.2$

$= 132\ cm^2$

(b) External curved surface area

Diameter = 12 cm
Radius = 6 cm
Height (length) = 4.2 cm

CSA of Cylinder = Rectangle Area

$= l \times b = 2\pi r \times h$

$= 2 \times 3.143 \times 6 \times 4.2$

$= 158.4\ cm^2$

(c) Total surface area

TSA of Cylinder = $2\pi rh + 2\pi r^2$

$= 2\pi r(h + r)$

$= 2 \times 3.143 \times 6(4.2+6)$

$= 384.7\ cm^2$

3. A cylindrical tank hich is open at the top has diameter 14 m and height 15 m. Find cost of its painting all over inside it @ Rs. 30/m^2.

Diameter = 14 m
Radius = 7 m
Height = 15 m
Rate = Rs. 30/m^2

CSA of Cylinder = Rectangle Area

$= l \times b = 2\pi r \times h$

$= 2 \times \frac{22}{7} \times 7 \times 15$

$= 660\ m^2$

Cost of painting = $30 \times 660\ m^2$

= Rs. 19800

4. The radius of base of closed right circular cylinder is 2.8 m and its length is 5 m. How many metre squares of metal sheet are needed to make cylinder.

Radius = 2.8 m
Length (height) = 5 m

TSA of Cylinder = $2\pi rh + 2\pi r^2$

$= 2\pi r(h + r)$

$= 2 \times 3.143 \times 2.8(5+2.8)$

$= 137.28\ m^2$

Total metal sheet needed to make cylinder

$= 137.28\ m^2$

5. Find height of cylinder of radius 3.5 cm and total surface area is 968 cm^2.

Radius = 3.5 cm

TSA of Cylinder = $2\pi r(h + r)$

$= 968\ cm^2$

$968\ cm^2 = 2 \times 3.14 \times 3.5(h + 3.5)$

$(h + 3.5) = \dfrac{968\ cm^2}{2 \times 3.14 \times 3.5}$

$(h + 3.5) = 44$

$h = 44 - 3.5$

$= 40.5\ cm$

Height of Cylinder = 40.5 cm

6. The length of cylindrical road roller and its diameter is 49 m. Find area covered by it in 200 revolutions.

Diameter = 49 m

Radius = 24.5 m

Length (height) = 49 m

CSA of Cylinder = $2\pi r \times h$

(One Revolution) = $2 \times \dfrac{22}{7} \times 24.5 \times 49$

$= 7546\ m^2$

CSA of 200 Revolutions = $200 \times 7546\ m^2$

$= 1509200\ m^2$

7. A rectangular piece of paper having length 88 cm and breadth 25 cm is folded along its length to form a cylinder. Find curved surface area of cylinder so formed.

Length = 88 cm

Breadth = 25 cm

Height (length) = 88 cm

CSA of Cylinder = Area of rectangle $= l \times b$

$= 88 \times 25$

$= 2200\ cm^2$

CSA of Cylinder = $2200\ cm^2$

8. An open cylindrical vessel whose length is 42 cm and diameter is 28 cm, is made up of metal sheet. Find area of metal sheet required for making the vessel.

Length (height) = 42 cm

Diameter = 28 cm

Radius = 14 cm

CSA of Cylinder = $2\pi r \times h$

$= 2 \times 3.14 \times 14 \times 42$

$= 3692.6\ cm^2$

Area of metal sheet required = $3692.6\ cm^2$

9. The ratio of height of right cylinder to its radius is 1 : 2 and its curved surface area is 616 m2. Find its diameter.

Ratio of Height to Radius = 1 : 2 (1a : 2a)

CSA of Cylinder = $2\pi r \times h = 616\ m^2$

Length (height) = 1a

CSA of Cylinder = $2\pi r \times h$

$616 = 2 \times 3.14 \times a \times 2a$

$616 = 12.56a^2$

$a^2 = \dfrac{616}{12.56} = 49$

$a = \sqrt{49} = 7$

Radius $r = 2a = 2 \times 7 = 14\ m$

Diameter $d = 2r = 2 \times 14 = 28\ m$

10. The lateral surface area of a hollow cylinder is 1408 cm2. It is cut along its height and a rectangular sheet of width 32 cm is formed. Find length and perimeter of rectangular sheet.

CSA of Cylinder = $2\pi r \times h = 1408\ cm^2$

Width = 32 cm

CSA of Cylinder = $l \times b$

$616 = l \times 32$

Length (l) = $\dfrac{1408}{32}$

$= 44\ cm$

Perimeter of rectangular sheet = $2(l + b)$

$= 2(44 + 32)$

$= 152\ cm$

11. Find surface area of a tube whose length is 21 cm, internal radius is 10 cm and thickness of metal sheet is 1.5 cm. Find cost of painting it all over @ Rs. 16 per cm^2.

Length (h) = 21 cm

Radius (r) - internal = 10 cm

Radius (R) - external = 11.5 cm

Thickness = 1.5 cm

Rate = Rs. $16/cm^2$

TSA of Cylinder = $2\pi r(h + r)$

$= 2 \times 3.14 \times 11.5(21 + 11.5)$

$= 1516.6\ cm^2$

Cost of painting = 1516.6×16

= Rs. 24,266

12. The total surface area of right circular cylinder is 1760 m2. The sum of its base radius and height is 40 cm. Find its curved surface area.

TSA of Cylinder = $1760\ m^2$ = $2\pi r(h+r)$

Sum of height + radius $(h+r)$ = 40 cm = 0.40 m

CSA of Cylinder = $2\pi rh$ = ?

TSA of Cylinder = $2\pi r(h+r)$

$1760\ m^2 = \frac{1760(40)}{2\pi * 40}$

$= \frac{1760^2}{2\times 3.14\times 40}$

$= \frac{1760}{251.2}$

Radius (r)

= 7 m

height + radius $(h+r)$ = 40 m

$(h+7)$ = 40 m

h = 33 m $(40-7)$

CSA of Cylinder = $2\pi rh$

= $2\times 3.143\times 7\times 33$

= $1452\ cm^2$

Exercise – 15.4

1. Find volume of cylinder with following dimensions:

(a) Radius = 42 m, Height = 2.1 m

Volume of Cylinder = πr^2h

= $3.143\times 42\times 2.1$

= $11643\ m^3$

(b) Base diameter = 4.2 cm,

Height = 11 cm

Base Radius (r) = 2.1 cm

Volume of Cylinder = πr^2h

= $3.143\times 2.1\times 2.1\times 11$

= $152.47\ cm^3$

(c) Area of base = $19\ m^2$, Height = 10 m

Area of base (πr^2) = $19\ m^2$

Volume of Cylinder = πr^2h

= 19×10

= $190\ m^3$

(d) Circumference of base = 44 m,

Height = 15 m

Circumference $(2\pi r)$ = 44 m

r = $\frac{44}{2\pi}$? $\frac{44}{2\times 3.14}$

r = 7 m

Volume of Cylinder = πr^2h

= $3.143\times 7\times 7\times 15$

= $2310\ m^3$

2. The radius and height of a cylinder are in ratio of 4 : 5 and its volume is 2160 m^3. Find its diameter and height.

Ratio of radius to height = 4a : 5a (say)

Volume of Cylinder = $2160\ m^3$ = πr^2h

$2160\ m^3$ = πr^2h

$2160\ m^3$ = $\pi(4a)^2(5a)$ = $80\pi a^3$

$80\pi a^3$ = $2160\ m^3$

a^3 = $\frac{2160}{80\pi}$? $\frac{2160}{80\times 3.14}$

a^3 = 8

a = $\sqrt[3]{8}$ = 2 m

Radius (4a) = 4×2 = 8 m

Diameter $(d=2r)$ = 2×8 = 16 m

Height (5a) = 5×2 = 10 m

3. The curved surface area of cylinder is 8800 dm^2 and the circumference of its base is 220 dm. Find volume of cylinder in m3.

CSA of cylinder = $2\pi rh$ = $8800\ dm^2$

Circumference of base = $2\pi r$ = 220 dm

Height of Cylinder = h = $\frac{8800}{2\pi r}$? $\frac{8800}{220}$

h = 40 dm

Radius of Cylinder = r = $\frac{220}{2\pi}$? $\frac{220}{2\times 3.14}$

r = 35.03 dm

Volume of cylinder (πr^2h)

= $3.14\times 35.03\times 35.03\times 40$

= $154123\ dm^3$

= $154\ m^3$

4. The radius of closed cylinder tank is 35 m long and has length 0.1 m. Find its volume.

Radius = 35 m

Length (Height) = 0.1 m

Volume of closed cylinder (πr^2h)

= $(3.14\times 35\times 35)\times 0.1$

= $385\ m^3$

5. A rectangular piece of paper of (22 cm × 4 cm) is folded without overlapping to make a cylinder of height 4 cm. Find volume of cylinder so obtained.

Diameter = 22 cm

Radius = 11 cm

Length (Height) = 4 cm

Volume of cylinder = $\pi r^2 h$

= $3.14 \times 11 \times 11 \times 4$

= $1521\ cm^3$

6. The dimensions of a rectangular vessel are 33 cm by 8 cm by 7 cm, if full of water. If that water is poured into a cylindrical pot of radius 10 cm, find the height of water level in cylindrical pot.

Volume of Rectangular vessel = $l \times b \times h$

= $33 \times 8 \times 7 = 1848\ cm^3$

Volume of Cylindrical vessel = $\pi r^2 h$

= $1848\ cm^3$

Radius of Cylinder = r = 10 cm

$\pi r^2 h = 1848\ cm^3$

$h = \frac{1848}{3.14 \times 102}$

Height = h = 5.88 cm

7. A piece of ductile metal is in the form of a cylinder of radius 2 cm and length 15 m. It is drawn into a wire of radius 2mm. Find length of wire so obtained.

Radius of cylinder = 0.02 m (2 cm)

Length (height) = 15 m

Radius of wire = 0.002 m (2 mm)

Volume of cylinder (metal) = $\pi r^2 h$

= $\pi(0.02)^2 \times 15$

Volume of cylinder (wire) = $\pi r2h$

= $\pi(0.002)^2 \times h$

$\pi(0.002)^2 \times h = \pi(0.02)^2 \times 15$

$h = \frac{\rho * 0.02)^0 \times 15}{\pi(0.002)^2}$

h = 15 m

8. A cylindrical roller is of length 2 m and diameter 84 cm. Find volume of roller.

Length (height) = 2 m

Diameter = 0.84 m (84 cm)

Radius = 0.42 m

Volume of cylinder = $\pi r^2 h$

= $3.14 \times 0.42 \times 0.42 \times 2$

= $1.1088\ m^3$

9. The diameter of a pipe is 21 cm. Water is flowing inside it at a speed of 2 km/hr. Find volume of water released by it in 1 minute.

Diameter = 0.21 m

= (21 cm)

Radius = 0.105 m

Length (height) = 2000 m

Volume of cylinder = $\pi r^2 h$

= $3.143(0.105)^2 \times 2000$

= 69.3 m3 /hour

= 1.155m3 /minute

10. A rectangular paper has dimensions 15 cm × 3 cm. It is revolved about its width. Find volume of cylinder so obtained.

Length (height) = 15 cm

Width (Diameter) = 3 cm

Radius = 1.5 cm

Volume of cylinder = $\pi r^2 h$

= $3.143(1.5)^2 \times 15$

= $106.08\ cm^3$

11. The length of a hollow cylindrical pipe is 35 m. Its outer and inner diameters are 17 m and 10 m. Find volume of metal used for making pipe and its weight if density of metal is 11 g/m3.

Length (height) = 35 m

Outer Diameter = 17 m

Outer Radius (R) = 8.5 m

Inner Diameter = 10 m

Inner Radius (r) = 5 m

Density of metal = $11\ g/m^3$.

Radius = 1.5 cm

Volume of metal used = $\pi R2h - \pi r2h$

= $\pi h(R^2 - r^2)$

= $3.14(35)(8.52 - 52)$

= $5198\ m^3$

Weight of metal = 5198/0.11 kg

= 57.17 kg

12. 2 circular cylinders have equal volumes & their radii are in ratio of 2 : 3. Find ratio of their heights.

	1st Cylinder		2nd Cylinder	
	Ratio of radii	=	2a :	3a (say)
Volume	=	$\pi r^2 H$	=	$\pi r^2 h$
	=	$\pi(2a)^2 H$	=	$\pi(3a)^2 h$
	=	$4a^2 H$	=	$9a^2 h$
	=	4H	=	9h
Ratio	=	9	:	4

Revision Exercise

1. Tick (✓) the correct answer:

(a) (iv) None (b) (i) 720 cm^3

(c) (iv) None

2. Find area of an isosceles triangle whose equal sides measure 13 cm each and 3rd side is 10 cm.

Given: Base of Isosceles Triangle = 10 cm

Length of equal sides = 13 cm

Base of one right triangle = $\frac{10}{2}$ = 5 cm

Height of right triangle = $\sqrt{132 - 52}$

= $\sqrt{169 - 25} = \sqrt{144}$

= 12 cm

Area of Isosceles Triangle = 2 × (2 right triangles)

= $2\left(\frac{1}{2} \times 5 \times 12\right)$

= 60 cm^2

Area of Isosceles Triangle = 60 cm^2

3. Find ratio of total surface area and lateral surface area of a cylinder whose radius is 15 cm and length is 23 cm.

Radius = 15 cm

Length (height) = 23 cm

CSA :	TSA
Area of Cylinder = $2\pi r \times h$	$2\pi r(h + r)$
= $2\pi \times 15 \times 23$	$2\pi \times 15(23 + 15)$
= $2\pi \times 15 \times 23$	$2\pi \times 15 \times 38$
= 23	38
Ratio = 38	: 23

4. The parallel sides of a trapezium are 15.2 cm and 13.8 cm. The distance between them is 7 cm. Find area of trapezium.

Area of trapezium PQRS

= $\frac{1}{2}$ × height × (Sum of parallel sides)

= $\frac{1}{2} \times 7 \times (15.2 + 13.8)$

= 3.5×29

= 101.5 cm^2

5. Find area of quadrilateral in which length of one of its diagonals is 18 dm and its offsets are 13 dm and 1.4 m. Also find area of quadrilateral.

Diagonal = 18 dm

Offsets = 13 dm and 14 dm

Area of quadrilateral

= $\frac{1}{2}$ × (Sum of perpendiculars) × Diagonal

= $\frac{1}{2} \times (13 + 14) \times 18$

= 27×9

= 243 dm^2

6. A building has 24 cylindrical pillars. The radius of each pillar is 14 cm and height is 10 cm. Find total cost of painting curved surface area of pillars @ Rs. 15 per m^2.

Radius of pillar (r) = 0.14 m (14 cm)

Height (h) = 0.10 m (10 cm)

No. of pillars = 24 Nos.

Cost of painting = Rs. 15/m^2

CSA of 1 pillar = $2\pi r \times h$

= $2 \times 3.14 \times 0.14 \times 0.10$

= 0.9 m^2

CSA of 24 pillars = 24×0.9

= 2.11 m^2

Cost of painting = 2.11×15

= Rs. 31.65

7. Find height of a cuboid whose base area is 180 cm^2 and volume is 900 cm^3.

Base area of cuboid = $l \times b$ = 180 cm^2

Volume of cuboid = 900 cm^3

Volume of cuboid = $l \times b \times h$

900 cm^3 = (180 cm2) × h

h = $\frac{900\ cm^3}{180\ cm^2}$

Height (h) = 5 cm

8. If we double the base of a parallelogram and corresponding altitude remains same, what happens to its area?

Clearly, the area of parallelogram will also double.

9. The circumference of base of a cylinder is 88 cm and its height is 15 cm. find volume of cylinder.

Circumference of base = 88 cm,

Height = 15 cm

Circumference $(2\pi r)$ = 88 cm

$r = \frac{88}{2\pi} ? \frac{88}{2\times 3.14}$

r = 14 cm

Volume of Cylinder = $\pi r^2 h$

= $3.143 \times 14 \times 14 \times 15$

= $9240\ cm^3$

Volume of Cylinder = $9240\ cm^3$

10. The ratio between radius of base and height of a cylinder is 2 : 3. Find total surface area of cylinder, if its volume is 1617 cm^3.

Ratio of radius to height = 2a : 3a (say)

Volume of Cylinder = $1617\ cm^3$ = $\pi r^2 h$

$1617\ cm^3 = \pi(2a)2(3a) = 12\pi a^3$

$12\pi a^3 = 1617\ cm^3$

$a^3 = \frac{1617}{12\rho} = 42.9$

$a = \sqrt[3]{42.9} = 3.5$

Radius (2a) = 2×3.5 = 7 cm

Height (3a) = 3×3.5 = 10.5cm

TSA of Cylinder = $2\pi r(h + r)$

= $2 \times 3.143 \times 7(10.5 + 7)$

= $770\ cm^3$

Total Surface Area of Cylinder = $770\ cm^3$

11. A rectangular water reservoir has 105 m^3 of water. Find depth of water in reservoir, if its base measures 12 m × 3.5 m.

Volume of Rectangular vessel = $l \times b \times h$

= $105\ m^3$

Base area of Rectangular vessel = $l \times b$

$= 12 \times 3.5$ = $42\ cm^2$

Height (Depth) h = = ?

Volume of Rectangular vessel = $(l \times b) \times h$ = $105\ m^3$

= $(42\ cm^2) \times h$ = 105 m3

Height (Depth) h = $\frac{105 m^3}{42 cm^2}$

= 2.5 cm

Depth of water in reservoir (height) = 2.5 cm

12. Complete the following table:

	Length (*l*)	Breadth (b)	Height (h)	Volume (v)
a.	5 cm	6 cm	8 cm	***240 cm^3***
b.	**12 cm**	10 cm	2 cm	240 cm^3
c.	9 cm	**9 cm**	5 cm	405 cm^3
d.	10 cm	5 cm	**6.4 cm**	320 cm^3

Chapter –16 Data Handling

Exercise – 16.1 Refer to Hand-written pages.

Exercise – 16.2 Refer to Hand-written pages.

Revision Exercise

Arrange the above data in ascending order. Find:

(a) 92 (b) 14 (c) 78

1. Do it yourself.

2. Do it yourself.

3. Do it yourself.

4. Find arithmetic mean of the following data:

Sum of Data

= 7+40+35+34+55+10+17+10+51+41

= 300

$\text{Arithmetic Mean} = \frac{\text{Sum of terms}}{\text{No. of terms}}$

$? \frac{300}{10}$

Arithmetic Mean = 30

5. Find arithmetic mean of following data:

Cost of books	:	75	20	25	16	2
No. of books	:	3	2	1	4	5

Total cost : 225 + 40 + 25 + 64 + 10

= 364

Total Books : 15

Arithmetic Mean = $\frac{364}{15}$

= 24.27

6. The table shows distribution of height of students in a class. Answer the following:

(a) 70 (b) 70

(c) 4 students (d) 6 students

(e) 40 (f) 55

7. Do it yourself.

Chapter–17 Graphical Representation of Data

Exercise – 17.1

1. Do it yourself.

2. Do it yourself.

3. Do it yourself.

4. **Draw a graph and solve the following questions:**

(a) Decrease, 30 sofa sets

(b) Highest - 1530 - November
Least - 1460 - October

(c) Average
= 1490+1510+1480+1500+1460+1530
Production

$$= \frac{8970}{6}$$

= 1495 sofa sets

Exercise – 17.2

1. Do it yourself. **2.** Do it yourself.

3. (a) Winter (b) 900, 1200, 1500
(c) Do it yourself.

4. Do it yourself. **5.** Do it yourself.

6. Do it yourself. **7.** Do it yourself.

8. Do it yourself.

Exercise – 17.3

1. Do it yourself.

2. Do it yourself.

3. Do it yourself.

4. Answer the following questions:

(a) The sports persons in age group of 10 years to 40 years in a locality.

(b) Age group having highest sports persons is : 25 to 30.

(c) Age group having least sports persons is: 10 to 15

(d) Class marks are : 12.5, 17.5, 22.5, 27.5, 32.5, 37.5.

(e) Class-size is : 5

(f) Number of sports persons in the locality : 4700 Persons

5. **Now, answer the following questions:**

(a) Total number of students in the class is : 23

(b) Age group having minimum students is : 170-180

(c) Age group having maximum students is : 140-150

(d) No. of students having height > 140 cm is : 18

(e) No. of students having height < 150 cm is : 12

(f) Number of sports persons in the locality : height of students of a class.

Revision Exercise

1. **Arrange the above data in ascending order and find:**

(a) The height of shortest boy is : 140 cm

(b) The height of tallest boy is : 152 cm

(c) The range of given data is : 12

(d) Do it yourself.

2. Do it yourself. **3.** Do it yourself.

4. Do it yourself. **5.** Do it yourself.

Chapter–18 Introduction to Graphs

Revision Exercise

Do it yourself.

Chapter–19 Probability

Exercise 19.1

1. **A dice thrown 60 times and 6 appeared 20 times. Find probability of obtaining 6 if thrown randomly.**

$$\text{Probability of getting 6} = \frac{\text{No. of times 6 appeared}}{\text{Total number of trials}}$$

$$= \frac{20}{60} = \frac{1}{3}$$

2. (a) Probability of getting B : $\frac{3}{10}$

(b) Probability of getting A : $\frac{1}{10}$

(c) Probability of getting C : $\frac{1}{5}$

(d) Probability of getting D : $\frac{2}{5}$

3. (a) Probability of an even number is : $\frac{1}{2}$

(b) Probability of a composite number is : $\frac{1}{2}$

(c) Probability of a prime number is : $\frac{1}{2}$

4. (a) Probability of a Yellow marble is : $\frac{2}{7}$

(b) Probability of a Red marble is : $\frac{3}{14}$

(c) Probability of not a Blue marble is : $\frac{1}{2}$

5. (a) Probability of a queen is : $\frac{1}{23}$

(b) Probability of a king is : $\frac{1}{23}$

(c) Probability of '10' of clubs & hearts : $\frac{1}{23}$

6. (a) Probability of multiple of 3 : $\frac{9}{48}$

(b) Probability of divisible by 5 : $\frac{1}{16}$

(c) Probability of a square number : $\frac{1}{48}$

7. If you put 10 red marbles and 6 green marbles in a bag. Which marbles will have greater probability?

Red marbles will have greater probability.

Revision Exercise

1. Tick (✓) the correct answer:

(a) (iv) Four (b) (i) Zero

(c) (i) 0.69 (d) (iv) None

2. Find probability that the chosen students have blood group:

(a) O has probability of : $\frac{14}{40}$? $\frac{7}{20}$

(b) AB has probability of: $\frac{8}{40}$? $\frac{1}{5}$

3. What is the probability of:

(a) 1 tail has probability of : $\frac{112}{250}$? $\frac{56}{125}$

(b) 2 tails have probability of : $\frac{85}{250}$? $\frac{17}{50}$

(c) 3 tails have probability of : $\frac{33}{250}$

(d) 0 tail has probability of : $\frac{20}{250}$? $\frac{2}{25}$

4. Find the probability of following:

(a) Probability of White Balls : $\frac{10}{33}$

(b) Probability of Not Black Balls : $\frac{24}{33}$

(c) Probability of Not Red Balls : $\frac{26}{33}$

5. Ans: Consonants would have greater probability of each letter.

6. What is the probability of getting:

(a) Probability of 'a heart' is : $\frac{9}{46}$

(b) Probability of 'a queen' is : $\frac{1}{16}$

(c) Probability of 'ten clubs' is : $\frac{1}{48}$

7. In 150 throws of a dice, 2 is obtained 75 times. Find the probability of getting 2:

Probability of getting 2

$= \frac{\text{No. of times 2 appeared}}{\text{Total number of trials}}$

$= \frac{75}{150}$

Probability of getting 2 $= \frac{1}{2}$

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