BRAIN BUILDER Series

Maths

Teacher's Manual

Class VII

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An ISO 9001 : 2008 Certified Company
(Publishers of Quality Educational Books)

Content

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1 KNOWING OUR NUMBERS

Integers

Exercise 1A

1. (a) $|-25| = 25$ (b) $|74| = 74$
   (c) $|-63| = 63$ (d) $|-8| = 8$
   (e) $|-12| = 12$
2. (a) $(-3)^2 \times (-2)^4 \times (-1)^5$
   $= 9 \times 16 \times -1 = -144$
   (b) $(-6)^3 \times (10)^2$
   $= 216 \times 100 = 21600$
   (c) $|-8| + |8|$
   $8 + 8 = 16$
   (d) $-|-11| + |11|$
   $-11 + 11 = 0$
   (e) $|-3| + |-2| + |-7|$
   $3 + 2 + 7 = 12$
   (f) $5 \times [25 + \{(-4) \times (16 - 8 \div 2)\}]$
   $5 \times [25 + \{(-4) \times (16 - 4)\}]$
   $5 \times [25 + (-4) \times 12]$
   $5 \times [25 - 48]$
   $5 \times (-23) = -115$
3. (a) -9 and 8
   $-9 + 8 = -1$
   (b) $17 + (-2) = 15$ (c) $-6 + 6 = 0$
4. (a) $26 = -26$ (b) $-43 = 43$
   (c) $-101 = 101$ (d) $-1 = 1$
   (e) $-25 = 25$ (f) $408 = -408$
5. Subtract
   (a) 15 from -2
   $(-2) - 15 = -(15 + 2) = -17$

(b) -4 from -3

$(-3)-(-4)=-3+4=1$

(c) -18 from 13

$-13-(-18)=13+18=31$

6. Let Sum of integer a and b $=(-15)$

If $a=-18$

$-18+b=-15$

$b=-15+18$

$b=3$

So, other integer $=3$

7. $13-(-6)=13+6=19$

$-6-13=-19$

No; $13-(-6)\neq-6-13$

8. 0 is the integer which is neither positive nor negative.

9. $(-36+52)-48$

$16-48=-32$

10. $(-34+40)-[-9+(-19)]$

$6-(-9-19)]$

$6-(-28)$

$6+28=34$

Exercise 1B

1. (a) $-17\times-17=289$ (b) $14\times-9=-126$

(c) $-2\times5\times6\times-1=60$ (d) $10\times0=0$

2. (a) positive (b) negative

(c) negative

3. (a) $(-35\div5)=-7$

(b) $(-70)\div(-14)=70\div14=5$

(c) $121\div(-11)=-(121\div11)=-11$

(d) $(-1899)\div9=-(1899\div9)=-211$

4. (a) positive (b) negative

(c) $-(210\div5)=-42$ (d) $(-600)\div(-12)=50$

(e) $-32\div2=-16$

Exercise 1C

1. (a) False (b) False
   (c) True (d) True
   (e) True (f) False
   (f) False
2. (a) $(433 \times 549) \times 0$
   $(433 \times 0) \times 549 = 0 \times 549 = 0$
   (b) $156 \times 88 + 156 \times 1$
   $156\,(88 + 1) = 156 \times 89 = 13884$
   (c) $235 \times 28 + 235$
   $235\,(28 + 1) = 235 + 29 = 6815$
   (d) $(-111) \times (-44) + (-44) \times (-121)$
   $44\,(111 + 121) = 44 \times 232 = 10208$
3. (a) $2 \times [(-6) \times (-7)]$
   $2 \times [42] = 84$
   (b) $-12 \times [(-10) \times (5)]$
   $-12 \times (-50) = 600$
   (c) $-9 \times [-1) \times (2)]$
   $-9 \times -2 = 18$
   (d) $143 \times [(-100) \times (-1)]$
   $143 \times 100 = 14300$
4. (a) $3 \times (-16) = -48$
   (b) $-67 \times 24 = -1608$
   (c) $(-5) \times 2 \times (-117) = -10 \times -117 = 1170$
   (d) $(-122) \times 4 = -488$
   (e) $(-98) \times (-81) = 7938$
   (f) $(-1) \times (-9) \times (-345) = -(9 \times 345) = -3105$
5. (a) $4 \times (-6 + x) = 5 \times (-2) + 3$
   $-24 + 4x = -10 + 3$
   $4x = -7 + 24$
   $x = \frac{17}{4}$

(b) $2 \times (3+8) = x(-1) + (7 \times 6)$

$2 \times 11 = -x + 42$

$x = 42 - 22$

$x = 20$

(c) $(213 \times 77) + (77 \times 213) = (213 \times 77) + (x \times 213)$

$(213 \times 77) + (77 \times 213) - (213 \times 77) = x \times 213$

$$x = \frac{77 \times 213}{213} = 77$$

(d) $15 \times (14+32) = (15 \times 14) + (x \times 32)$

$(15 \times 14) + (15 \times 32) - (15 \times 14) = (x \times 32)$

$$x = \frac{15 \times 32}{32} = 15$$

(e) $x \times [(-5) + (-3)] = 24 \times (-5) + 24 \times (-3)$

$x = [(-5) + (-3) = 24[(-5) + (-3)$

$$x = \frac{24[(-5) + (-3)}{[(-5) + (-3)]} = 24$$

Exercise 1D

1. Let one numebr be = x

   Then $x + 250 = -310$

   $x = -310 + (-250)$

   $x = -560$

2. Even number between 10 and 20 are

   12, 14, 16, 18

   odd number = 11, 13, 15, 17, 19

   Sum of even numbers = 12 + 14 + 16 + 18 =

   Sum of odd numbers = 11 + 13 + 15 + 17 + 19

   The difference is to be

   $(11 + 13 + 15 + 17 + 19) - (12 + 14 + 16 + 18)$

   $75 - 60 = 15$

3. Let one of them be x

   So, $-4 \times x = 128$

$$x = \frac{128}{-4} = -32$$

$x = -32$

4. An aircraft
   Fly at height = 650 m
   land at height = 260m
   So, height loss = 390m
5. The man travelled
   60 km east = +60
   100 km west = –100
   Finally = 60 + (–100) = –40
   or 40 km towards west.
6. Rajan deposit
   On Tuesday = ₹ 8000
   On Thursday = ₹ 5500
   Total amount = ₹ 13500
   Rajan withdrew
   On Wednesday = ₹ 2500
   Left amount in bank is = ₹ (13500 – 2500) = ₹ 11000
7. Temperature on a day = 36°C
   Temperature may rise or may fall down = 4°C
   So resulting temperature can be = 36 + 4 = 40° (if rises)
   or
   36 – 4 = 32° C (if falls)
   Ans. 40°C or 32°C
8. Temperatuing during months = 23°C
   Actual temperature at 6 am = 23 – 7 = 16°C
   At 9 am = 23 + 5 = 28°C
   At 12 noon = 23 + 8 = 31°C
   At 4 pm = 23 + 2 = 25°C

Check Your Mental Maths IQ

1. Zero
2. Zero
3. Integer itself
4. Zero
5. One

Multiple Choice Questions (MCQ)

1. (b)

Let one number be x

Then $-16 = -8 + x$

$-16 + 8 = x$

$-8 = x$

2. (d) $5 - (-9) = +14$
3. (a)

Let 'x' must be subtracted

So, $-2 - x = -6$

$6 - 2 = x$

$4 = x$

4. (b) Let number be 'a'

$\frac{a}{3} \times \frac{-15}{1}$ So, $a = -45$

5. (c) 0
6. (a) $\left(\frac{\{-8 + (-12)\} - 10}{3}\right) \times -2$

$\left(\frac{-20 - 10}{3}\right) \times -2 = \left(\frac{-30}{3}\right) \times -2$

$-10 \times -2 = +20$

7. (b) $0 \div 8 = 0$
8. (a) $(-65) \div (-65) = 1$
9. (a) Solution : tanker contains = 400 ℓ

decrease in petrol in 1 hour = 9ℓ

and in 10 hours = 90 ℓ

So, left petrol is = $400 - 90 = 310$ ℓ

2 Fractions And Rational Numbers

Exercise 2A

1. (a) $\frac{3}{5}+\frac{4}{5}=\frac{3+4}{5}=\frac{7}{5}$

(b) $\frac{8}{17}-\frac{3}{17}=\frac{8-3}{17}=\frac{5}{17}$

(c) $\frac{5}{14}+\frac{9}{14}=\frac{5+9}{14}=\frac{14}{14}=1$

(d) $\frac{15}{21}-\frac{11}{21}=\frac{15-11}{21}=\frac{4}{21}$

2. (a) $\frac{16}{5}-\frac{17}{7}$

$$\frac{16\times7-17\times5}{35}=\frac{112-85}{35}=\frac{27}{35}$$

(b) $\frac{5}{2}+\frac{7}{3}-\frac{5}{4}=\frac{5\times6+7\times4+(-5)\times3}{12}$

$$=\frac{30+28+(-15)}{12}=\frac{43}{12}$$

(c) $4\frac{1}{6}+3\frac{1}{4}=\frac{25}{6}+\frac{13}{4}=\frac{25\times2+13\times3}{12}$

$$\frac{50+39}{12}=\frac{89}{12} \text{ or } 7\frac{5}{12}$$

(d) $\frac{5}{1}+\frac{3}{5}-\frac{7}{10}=\frac{5\times10+3\times2-7\times1}{10}$

$$= \frac{50+6-7}{10} = \frac{49}{10} \quad \text{or} \quad 4\frac{9}{10}$$

4. (a) $\frac{1}{4} \times \frac{176}{31} = \frac{44}{31}$

(b) $\frac{9}{10} \times \frac{1000}{999} = \frac{100}{111}$

(c) $\frac{1}{10} \times \frac{55}{64} = \frac{11}{128}$

5. Earning = ₹ 5400

Saving = $\frac{1}{9} \times 5400$

= ₹ 600 per month

During year = 12×600 = ₹ 7200 per year

6. Total sutdents = 475

Girls = $\frac{2}{5}$ of them $= \frac{2}{5} \times 475$

So, 190 students were girls

Boys = $475 - 190 = 285$

Boys = 285

7. (a) $2\frac{4}{7} + \square = 6$

$= \frac{6}{1} - \frac{18}{7}$

$= \frac{42-18}{7}$

$= \frac{24}{7}$ or $3\frac{3}{7}$

(b) $\frac{12}{1} - 2\frac{3}{4} = \frac{\square}{4}$

$$\frac{12}{1}-\frac{11}{4}=\frac{\square}{4}$$

$$\frac{48-11}{4}=\frac{37}{4}$$

So, missing number = 37

(c) $5\frac{1}{3}+9\frac{2}{3}=\frac{16}{3}+\frac{29}{3}=\frac{44}{3}$ or $14\frac{2}{3}$

(d) $9\frac{3}{8}-2\frac{1}{8}=\frac{75}{8}-\frac{17}{8}=\frac{58}{8}=\frac{29}{4}$ or $7\frac{1}{4}$

8. (a) Divide $\frac{24}{30}$ by 9

$$\frac{24}{30\times 9}=\frac{4}{45}$$

(b) Divide 45 by $\frac{15}{7}=\frac{45\times 7}{15}=21$

(c) $\frac{5\times 3}{2\times 2}=\frac{15}{4}$ or $3\frac{3}{4}$

9. (a) Reciprocal of $8=\frac{1}{8}$

(b) Reciprocal of $\frac{-11}{13}=\frac{-13}{11}$

(c) Reciprocal of $\frac{7}{8}=\frac{15}{8}=\frac{8}{15}$

(d) Reciprocal of $\frac{3}{4}\times\frac{1}{3}=\frac{3}{12}=\frac{12}{3}=4$

10. (a) $\frac{1\frac{1}{3}\times 1\frac{1}{5}}{3\frac{1}{4}\times 1\frac{1}{4}}=\frac{\frac{4}{3}\times\frac{6}{5}}{\frac{13}{4}\times\frac{5}{4}}=\frac{24\times 16}{15\times 13\times 5}=\frac{128}{325}$

(b) $$\frac{\frac{61}{8}+\frac{541}{24}}{\frac{183}{11}+\left(\frac{-17}{3}\right)}=\frac{\frac{183+541}{24}}{\frac{549-187}{33}}$$

$$=\frac{724\times 33}{24\times 362}=\frac{11}{4} \text{ or } 2\frac{3}{4}$$

11. A man has ₹ 9,600

To Ist son = $\frac{1}{6}\times 9600 =$ ₹ 1600 to Ist son

Remaining left = ₹ 9600 – ₹ 1600 = ₹ 8000

To 2nd son = $\frac{1}{4}\times$ ₹ 8000 = ₹ 2000

To his wife = ₹ 9600 – ₹ 2000 – ₹ 1600 = ₹ 6000

Exercise 2B

1. $\frac{3}{5}\times\frac{1}{5}\div\frac{2}{3}=\frac{3}{2}\times\frac{1}{5}\times\frac{3}{2}=\frac{9}{20}$

2. $1\frac{1}{6}\div\frac{1}{2}\times 12$

$=\frac{7}{6}\div\frac{1}{2}\times 12$

$=\frac{7}{6}\times\frac{2}{1}\times\frac{12}{1}=28$

3. $\frac{12}{13}\times 4\div 7$

$=\frac{12}{13}\times\frac{4}{7}=\frac{48}{91}$

4. $\left(\frac{\frac{1}{5}}{\frac{19}{5}}\times 19\right)\div 5 \Rightarrow \left(\frac{1}{5}\times\frac{5}{19}\times 19\right)\div 5$

$\Rightarrow \left(\frac{5\times 19}{19\times 5}\right)\div 5 = \frac{1}{5}$

5. $\left(\frac{16}{5}\div\frac{6}{5}\right)\div\left(\frac{16}{3}-\frac{11}{5}\right)$ of $\frac{11}{20}$

$\left(\frac{16}{5}\times\frac{5}{6}\right)\div\left(\frac{16\times 5-11\times 3}{15}\right)$ of $\frac{11}{20}$

$\left(\frac{8}{3}\right)\div\left(\frac{80-33}{15}\right)$ of $\frac{11}{20}$

$\left(\frac{8}{3}\right)\div\left(\frac{47}{15}\times\frac{11}{20}\right)$

$\frac{8}{3}\times\frac{15\times 20}{47\times 11}=\frac{800}{517}$

6. $\frac{12}{5}\div\frac{3}{4}$ of $\frac{2}{5}+\frac{1}{2}$ of $\frac{3}{4}-\frac{107}{72}$

$\Rightarrow \frac{12}{5}\div\frac{6}{25}+\frac{3}{8}-\frac{107}{72}=\frac{12}{5}\times\frac{25}{6}+\frac{3}{8}-\frac{107}{72}=\frac{10}{1}+\frac{3}{8}-\frac{107}{72}$

$\Rightarrow \frac{720+27-107}{72}=\frac{640}{72}=\frac{80}{9}=8\frac{8}{9}$

7. $2\frac{2}{3}$ of $2\frac{1}{4}+\frac{1}{9}\times 4\frac{1}{2}-2\frac{2}{3}\div\frac{8}{9}$

$\frac{8}{3}$ of $\frac{9}{4}+\frac{1}{9}\times\frac{9}{2}-\frac{8}{3}\div\frac{8}{9}$

$\frac{8}{3}\times\frac{9}{4}+\frac{1}{9}\times\frac{9}{2}-\frac{8}{3}\div\frac{9}{8}$

$$\frac{6}{1}+\frac{1}{2}-\frac{3}{1}$$

$$\frac{12+1-6}{2}=\frac{7}{2}=3\frac{1}{2}$$

8. $$\frac{7}{6}\times\frac{21}{4}+\left[\frac{9}{2}-\frac{3}{10}\right]\div\frac{16}{15}\times\frac{1}{3}-\frac{27}{4}\div\frac{1}{2}of\frac{8}{3}$$

$$\frac{7}{6}\times\frac{21}{4}+\left[\frac{45-3}{10}\right]\div\frac{16}{15}\times\frac{1}{3}-\frac{27}{4}\div\frac{1}{2}of\frac{8}{3}$$

$$\frac{7}{6}\times\frac{21}{4}+\frac{42}{10}\div\frac{16}{15}\times\frac{1}{3}-\frac{27}{4}\div\frac{1}{2}of\frac{8}{3}$$

$$\frac{7}{6}\times\frac{21}{4}+\frac{42}{10}\div\frac{16}{15}\times\frac{1}{3}-\frac{27}{4}\div\frac{4}{3}$$

$$\frac{7}{6}\times\frac{21}{4}+\frac{42}{10}\times\frac{15}{16}\times\frac{1}{3}-\frac{27}{4}\times\frac{3}{4}$$

$$\frac{49}{8}+\frac{21}{16}-\frac{81}{16}$$

$$\frac{98+21-81}{16}\Rightarrow\frac{38}{16}=2\frac{3}{8}$$

9. $$\left(6\frac{1}{2}+\frac{1}{3}\right)\div\left[5\frac{1}{2}-\left\{4\frac{1}{2}-\left(2\frac{1}{2}-\overline{3\frac{1}{2}-1\frac{1}{2}}\right)\right\}\right]$$

$$\left(\frac{13}{2}+\frac{1}{3}\right)\div\left[\frac{11}{2}-\left\{\frac{9}{2}-\left(\frac{5}{2}-\overline{\frac{7}{2}-\frac{3}{2}}\right)\right\}\right]$$

$$\left(\frac{13}{2}+\frac{1}{3}\right)\div\left[\frac{11}{2}-\left\{\frac{9}{2}-\left(\frac{5}{2}-\overline{\frac{7-3}{2}}\right)\right\}\right]$$

$$\left(\frac{13}{2}+\frac{1}{3}\right)\div\left[\frac{11}{2}-\left\{\frac{9}{2}-\left(\frac{5}{2}-\frac{2}{1}\right)\right\}\right]$$

$$\left(\frac{39+2}{6}\right)\div\left[\frac{11}{2}-\left\{\frac{9}{2}-\left(\frac{5-4}{2}\right)\right\}\right]$$

$$\frac{41}{6}\div\left[\frac{11}{2}-\left\{\frac{9}{2}-\frac{1}{2}\right\}\right]$$

$$\frac{41}{6}\div\left[\frac{11}{2}-\left\{\frac{9-1}{2}\right\}\right]$$

$$\frac{41}{6}\div\left[\frac{11}{2}-\frac{4}{1}\right]$$

$$\frac{41}{6}\div\left[\frac{11-8}{2}\right]$$

$$\frac{41}{6}\div\frac{3}{2}=\frac{41}{6}\times\frac{2}{3}=\frac{41}{9}\,or\,4\frac{5}{9}$$

Exercise 2C

1. (a) $\frac{5}{-6}$ = Negative (b) $\frac{-111}{123}$ = Negative

   (c) $\frac{-8}{-19}$ = Positive (d) -7 = Negative

2. (a) Yes (b) Yes

   (c) Yes (d) Yes

3. $\frac{5}{0}, \frac{2}{0}$

4. (a) $\frac{-3}{8}$ = numerator = -3; denominator 8

   (b) $\frac{4}{7}$ = numerator = 4; denominator 7

(c) $\frac{-12}{11}$ numerator $= -12$; denominator $= 11$

(d) $\frac{-7}{-16}$ numerator $= -7$; denominator $= -16$

5. (a) -24. $\frac{-6}{9} \times \frac{4}{4} = \frac{-24}{36}$

(b) 60 $\frac{-6}{9} \times \frac{-10}{10} = \frac{+60}{-90}$

(c) 12 $\frac{-6}{9} \times \frac{-2}{-2} = \frac{12}{-18}$

(d) -78 $\frac{-6}{9} \times \frac{13}{13} = \frac{-78}{117}$

6. (a) $\frac{5}{-7} \times \frac{-5}{-5} = \frac{-25}{35}$ (b) $\frac{5}{-7} \times \frac{2}{2} = \frac{10}{-14}$

(c) 56; $\frac{5}{-7} \times \frac{-8}{-8} = \frac{-40}{56}$ (d) $\frac{5}{-7} \times \frac{+3}{3} = \frac{15}{-21}$

7. (a) $-1 = \frac{-2}{2}, \frac{-3}{3}, \frac{-4}{4}$ (b) $\frac{4}{5} = \frac{8}{10}, \frac{12}{15}, \frac{16}{20}$

(c) $\frac{-3}{8} = \frac{-6}{16}, \frac{-9}{24}, \frac{-12}{32}$ (d) $\frac{7}{-9} = \frac{14}{-18}, \frac{21}{-27}, \frac{28}{-36}$

8. (a) $\frac{20}{45} = \frac{4}{9}$ as $\frac{20 \div 5}{45 \div 5}$

(b) $\frac{-16}{24} = \frac{-4}{6} = \frac{-2}{3}$ as $\frac{-16 \div 8}{24 \div 8}$

(c) $\frac{-48}{-32} = \frac{3}{2}$ $\frac{3}{2}$ as $\frac{-48 \div 16}{-32 \div 16}$

(d) $\frac{-78}{91} \Rightarrow \frac{-78 \div 13}{91 \div 13} = \frac{-6}{7}$

9. (a) $\frac{-7}{16} = \frac{x}{64}$

$\frac{-7}{16} \times \frac{4}{4} = \frac{-28}{64}$ as $x = -28$

or $16 \times x = -7 \times 64$, $x = \frac{-7 \times 64}{16} = -28$

(b) $\frac{5}{8} = \frac{40}{x}$ $5x = 40 \times 8$

$x = \frac{40 \times 8}{5} = 64$

(c) $\frac{x}{9} = \frac{3}{27}$ $x = \frac{1}{9} \times \frac{9}{1} = 1$

10. (a) $\frac{-2}{10} \times \frac{10}{-25} = +50 \neq 100$; No

(b) $\frac{1}{3} \times \frac{-4}{12} = 12 \neq -12$; No

(c) $\frac{7}{8} \times \frac{-5}{16} = -40 \neq 112$; No

(d) $\frac{5}{7} \times \frac{15}{21} = 105 = 105$; Yes

Exercise 2d

1. (a) $\frac{0}{4}$ and $\frac{0}{3}$ (c) $\frac{3}{-5}$ and $\frac{9}{-15}$

2. (a) True (b) True

3. (a) $\frac{-6}{11} < \frac{5}{8}$

(by cross multiplication, we have $-48 < 55$)

(b) $\frac{3}{5} > \frac{7}{12}$ (c) $\frac{-5}{2} < \frac{-1}{2}$

(d) $\frac{3}{7} > \frac{-6}{13}$ (e) $\frac{-11}{-12} < \frac{10}{13}$

(f) $\frac{-7}{9} = \frac{-7}{9}$

4. (a) $0 > \frac{-2}{5}$ (b) $\frac{4}{1} > \frac{-1}{4}$

(c) $\frac{5}{3} > \frac{-7}{3}$

5. $\frac{-1}{2} < 0$ $\frac{1}{3} < \frac{1}{2}$ $\frac{-9}{8} < \frac{-8}{9}$

6. $-2, -10$

7. $\frac{-6}{9}, \frac{-5}{9}, \frac{-4}{9}, \frac{-3}{9}, \frac{-2}{9}, \frac{-1}{9}, 0, \frac{1}{9}, \frac{2}{9}, \frac{3}{9}$

9. (a) $\frac{2}{5} < \frac{4}{7} < \frac{11}{14} < 3$ (b) $\frac{-12}{10} < \frac{-10}{15} < \frac{1}{2}$

10. (a) $\frac{2}{3} > \frac{4}{10} > \frac{-1}{5} > \frac{-1}{6}$ (b) $\frac{7}{11} > \frac{-3}{5} > \frac{-2}{3}$

Exercise 2E

1. (a) $\frac{-3}{8}+\frac{4}{5}=\frac{-15+32}{40}=\frac{17}{41}$

(b) $\frac{1}{17}\ and\ \frac{-16}{17}=\frac{7-16}{17}=\frac{-15}{17}$

(c) $\frac{2}{9}\ and\ \frac{9}{2}=\frac{2\times2+9\times9}{18}=\frac{4+81}{18}=\frac{85}{18}$

(d) $\frac{-4}{9},\frac{-5}{12}\ and\ \frac{11}{18}=\frac{-4}{9}-\frac{-5}{12}+\frac{11}{18}$

$$=\frac{-16-15+22}{36}=\frac{-9}{36}=\frac{-1}{4}$$

2. (a) $\frac{-3}{4}\ from\ \frac{-2}{3}=\frac{-2}{3}+\frac{3}{4}=\frac{-8+9}{12}=\frac{1}{12}$

(b) $\frac{-6}{11}\ from\ \frac{15}{7}=\frac{15}{7}+\frac{6}{11}=\frac{165+42}{77}=\frac{207}{77}$

(c) $\frac{1}{4}\ from\ \frac{17}{12}=\frac{17}{12}-\frac{1}{4}=\frac{17-3}{12}=\frac{14}{12}=\frac{7}{6}$

(d) $\left[\left(\frac{-5}{7}\right)+\left(\frac{-7}{9}\right)\right]-\frac{9}{11}$

$$\left[\left(\frac{-5}{7}\right)+\left(\frac{-7}{9}\right)\right]-\frac{9}{11}=\left[\frac{-45-49}{63}\right]-\frac{9}{11}$$

$$\frac{-94}{63}-\frac{9}{11}=\frac{-1034-567}{693}=\frac{1601}{693}$$

3. Let the added number be 'a'

$$\frac{2}{3}+a=\frac{-100}{33}$$

$$a = \frac{-100}{33} - \frac{2}{3}$$

$$= \frac{-100-22}{33} = \frac{-122}{33}$$

4. Let the subtracted one be 'b'

$$\frac{13}{14} - b = \frac{13}{14}$$

$$-b = \frac{13}{14} - \frac{13}{14} = 0$$

$$b = 0$$

5. Let one be 'a'

$$\frac{-1}{9} + a = -8$$

$$a = -8 + \frac{1}{9}$$

$$= \frac{-72+1}{9}$$

$$a = \frac{-71}{9}$$

6. (a) On LHS $\frac{13}{10} - \frac{7}{15} = \frac{(13\times 3)+(-7\times 2)}{30} = \frac{-14+39}{30}$

$$= \frac{+25}{30} \div \frac{5}{5} = \frac{+5}{6}$$

and on RHS $\frac{-7}{15} + \frac{13}{10} = \frac{-14+39}{30} = \frac{+25}{30} \div \frac{5}{5} = \frac{5}{6}$

$\therefore$ LHS = RHS (hence verified)

(b) On LHS $\frac{-3}{4}+\frac{17}{8}+\frac{-1}{2}=\frac{-3\times2+17-4}{8}=\frac{7}{8}$

On RHS $\frac{-1}{2}-\frac{3}{4}+\frac{17}{8}=\frac{-4-6+17}{8}=\frac{7}{8}$

$\therefore$ LHS = RHS (Hence verified)

7. $\frac{7}{9}-\frac{5}{12}=\frac{28-15}{36}=\frac{13}{36}-\left(\frac{-5}{12}+\frac{7}{9}\right)$

$=\frac{13}{36}-\frac{13}{36}=0$

8. (a) $\frac{2}{9}+\frac{-5}{12}+\frac{11}{24}=\frac{16-30+33}{72}=\frac{19}{72}$

Ans. $\frac{19}{72}$

(b) $\frac{3}{4}+\left(\frac{-13}{8}\right)+\left(\frac{-11}{15}\right)+\frac{7}{12}=\frac{90-195-88+70}{120}$

$=\frac{-123}{120}\ or\ \frac{-41}{40}$

Exercise 2F

1. (a) $\frac{15}{4}\times\frac{4}{7}=\frac{15\times4}{4\times7}=\frac{60}{28}=\frac{15}{7}$

(b) $\frac{8}{1}\times\frac{-2}{9}=\frac{-16}{9}$ (c) $\frac{-3}{5}\times\frac{-14}{6}=\frac{+14}{10}=\frac{7}{5}$

(d) $\frac{7}{2}\times\frac{14}{5}\times\frac{2}{7}=\frac{14}{5}$

2. (a) 1 (b) $\frac{-4}{3}$

(c) $\frac{-11}{-20}=\frac{-20}{-11}$ (d) $\frac{13}{5}=\frac{5}{13}$

3. (a) $\frac{-4}{9}\div\frac{10}{27}=\frac{-4\times27}{9\times10}=\frac{-6}{5}$

(b) $\frac{-5}{17}\div\frac{-3}{170}=\frac{-5}{17}\times\frac{170}{-3}=\frac{+50}{+3}=\frac{50}{3}$

(c) $\frac{11}{2}\div\left(\frac{30}{-5}\right)=\frac{11\times-5}{2\times30}=\frac{-11}{12}$

(d) $\frac{8}{15}\div\frac{3}{5}=\frac{8}{15}\times\frac{5}{3}=\frac{8}{9}$

4. Let one of them is 'x'

$$x\times-1=\frac{-8}{15}\Rightarrow x=\frac{-8}{15\times-1}$$

$$x=\frac{8}{15}$$

5. (a) $\left[\frac{35}{6}\times\frac{-3}{7}\right]-\left[\frac{3}{8}\times\frac{-32}{9}\right]$

$$\Rightarrow\frac{-5}{2}+\frac{4}{3}$$

$$\Rightarrow\frac{-15+8}{6}=\frac{-7}{6}$$

(b) $\left[\frac{-28}{27}\right]\div\left[\frac{-5}{9}\right]$

$$\Rightarrow\frac{-28}{27}\times\frac{9}{-5}$$

$$\Rightarrow\frac{28}{15}$$

(c) $\frac{-11}{7} \times \frac{4}{14} \times \frac{21}{33} = \frac{-2}{7}$

(d) $\frac{7}{9} \div \left(\frac{-2}{3}\right)$

$\frac{7}{9} \times \frac{3}{-2} = \frac{-7}{6}$

6. (a) $\frac{3}{17} \div \square = \frac{-3}{17}$

$\frac{3}{17} \times \frac{1}{x} = \frac{-3}{17}$

$\frac{1}{x} = \frac{-3 \times 17}{17 \times 3} = -1$

So, $x = -1$

(b) $\frac{-15}{2} \div x = 1$

$\frac{-15}{2} \times \frac{1}{x} = 1$

$\frac{1}{x} = \frac{1 \times 2}{-15}$; so, $x = \frac{-15}{2}$

(c) $\frac{17}{4} \div x = -1$

$\frac{17}{4} \times \frac{1}{x} = -1$

$\frac{1}{x} = \frac{-1 \times 4}{17} = \frac{-4}{17}$ So, $x = -\frac{17}{4}$

(d) $x \div (-1) = \frac{55}{22}$

$$-x = \frac{55}{22}$$

$$x = \frac{-55}{22}$$

7. Let the number be 'x'

$$\frac{-7}{5} \times x = \frac{-28}{35}$$

$$x = \frac{-28}{35} = \frac{4}{7}$$

8. $\left(\frac{17}{5} + \frac{9}{2}\right) \div 2\frac{1}{4}$

$$\left(\frac{34+45}{10}\right) \div \frac{9}{4}$$

$$\frac{79}{10} \times \frac{4}{9} = \frac{158}{45}$$

Exercise 2G

1. (a) 0.4 (b) 0.15
   (c) 0.081 (d) 0.0287
2. (a) $1.3 + 0.52 + 6.91 + 8.04 = 16.77$
   (b) $4.35 + 3.6999 + 0.38 + 0.40 = 8.8299$
   (c) $5 + 6.253 + 0.417 + 0.1010 = 11.771$
   (d) $11.11 + 11.0111 + 0.11111 + 1.111101 = 23.343317$
3. (a) $48.190 - 7.723 = 40.467$
   (b) $222.22 - 200.10 = 22.12$
   (c) $62.010 - 51.008 = 11.002$
   (d) $975.200 - 313.026 = 662.174$

5. (a) $35.01 \times 100 = 3501$

(b) $0.0009 \times 10 = 0.009$

(c) $0.001 \times 0.001 \times 5000.75 = 0.00500075$

(d) $3.6225 \times 2.3 = \frac{36225}{10000} \times \frac{23}{10} = 8.33175$

6. (a) $\frac{2.35}{5} = 0.47$

(b) $0.0078 \div 0.0013$

$$\frac{0.0078 \times 10000}{0.0013 \times 10000} = \frac{78}{13} = 6$$

(c) 12.54 by 1000

$$\frac{12.54}{1000} = 0.01254$$

(d) 3.6225 by 2.3

$$\frac{3.6225}{2.3} \times \frac{10}{10} = \frac{36.225}{23} = 1.575$$

Exercise 2h

1. (a) $\frac{1}{2}$

$$2\overline{)\,10\,}\,0.5$$
$$\underline{10}$$
$$\times$$

$= 0.5$

(b) $\frac{11}{30}$

$$
\begin{array}{r|l}
30 & 11.0 \\
 & 90 \\
\hline
 & 200 \\
 & 180 \\
\hline
 & 20
\end{array}
\quad .36
$$

$= 0.366...$

(c) $\frac{43}{40}$

$$
\begin{array}{r|l}
40 & 43.0 \\
 & 40 \\
\hline
 & 300 \\
 & 280 \\
\hline
 & 200 \\
 & 200 \\
\hline
 & \times
\end{array}
\quad 1.075
$$

$= 1.075$

2. (a) $\frac{-7}{4}$

$$
\begin{array}{r|l}
4 & 7.0 \\
 & 4 \\
\hline
 & 30 \\
 & 28 \\
\hline
 & 20 \\
 & 20 \\
\hline
 & \times
\end{array}
\quad 1.75
$$

$= -1.75$

(b) $\frac{-17}{5}$

$$\begin{array}{r|l|l} 5 & 17.0 & 3.4 \\ & 15 & \\ \hline & 20 & \\ & 20 & \\ \hline & \times & \\ \hline \end{array}$$

$= -3.4$

(c) $\frac{-13}{2}$

$$\begin{array}{r|l|l} 2 & 13.0 & 6.5 \\ & 12 & \\ \hline & 10 & \\ & 10 & \\ \hline & \times & \\ \hline \end{array}$$

$= -6.5$

(d) $\frac{-1}{20}$

$$\begin{array}{r|l|l} 20 & 1.00 & 0.05 \\ & 100 & \\ \hline & \times & \\ \hline \end{array}$$

$= -0.05$

3. (a) $\frac{3}{4}$

$$\begin{array}{r|l|l} 4 & 3.00 & 0.75 \\ & 28 & \\ \hline & 20 & \\ & 20 & \\ \hline & \times & \\ \hline \end{array}$$

$= -0.75$

(b) $\frac{-7}{18}$

$$
\begin{array}{r|l}
18 & 7.00 \\
 & 54 \\
\hline
 & 160 \\
 & 144 \\
\hline
 & 160 \\
 & 144 \\
\hline
 & 16
\end{array}
\qquad 3.88
$$

$= -3.888$

(c) $\frac{27}{29}$

$$
\begin{array}{r|l}
29 & 27.0 \\
 & 261 \\
\hline
 & 90 \\
 & 87 \\
\hline
 & 30 \\
 & 27 \\
\hline
 & 3
\end{array}
\qquad 0.931
$$

$= 0.931$

(d) $\frac{5}{14}$

$$
\begin{array}{r|l}
14 & 5.0 \\
 & 42 \\
\hline
 & 80 \\
 & 70 \\
\hline
 & 100 \\
 & 98 \\
\hline
 & 2
\end{array}
\qquad 0.357
$$

$= 0.357$

4. (a) $\frac{-1}{15}$

$$
\begin{array}{r|l}
15 & 1.00 \\
 & 90 \\
\hline
 & 100 \\
 & 90 \\
\hline
 & 100 \\
 & 90 \\
\hline
 & 10
\end{array}
\quad 0.0666
$$

$= -0.0666$

(b) $\frac{-3}{14}$

$$
\begin{array}{r|l}
14 & 3.0 \\
 & 28 \\
\hline
 & 20 \\
 & 14 \\
\hline
 & 60 \\
 & 56 \\
\hline
 & 40 \\
 & 28 \\
\hline
 & 12
\end{array}
\quad 0.2142
$$

$= -0.2142$

(c) $\frac{-3}{22}$

$$
\begin{array}{r|l}
22 & 3.0 \\
 & 22 \\
\hline
 & 80 \\
 & 66 \\
\hline
 & 140 \\
 & 132 \\
\hline
 & 8
\end{array}
\quad 0.136
$$

$= -0.136$

(d) $\frac{-7}{18}$

$$\begin{array}{r|l} 18 & 7.00 \quad 0.388 \\ & 54 \\ \hline & 160 \\ & 144 \\ \hline & 160 \\ & 144 \\ \hline & 16 \\ \hline \end{array}$$

$= -0.3888$ or -0.389

5. (a) $\frac{5}{2}$

$$\begin{array}{r|l} 2 & 5.0 \quad 2.5 \\ & 4 \\ \hline & 10 \\ & 10 \\ \hline & \times \\ \hline \end{array}$$

$= 2.5$

(b) $\frac{6}{7}$

$$\begin{array}{r|l} 7 & 6.00 \quad 0.8571 \\ & 56 \\ \hline & 40 \\ & 35 \\ \hline & 50 \\ & 49 \\ \hline & 1 \\ \hline \end{array}$$

$= 0.8571$

(c) $\frac{9}{16}$

$$\begin{array}{r|l} 16 & 9.0 \quad 0.5625 \\ & \underline{80} \\ & 100 \\ & \underline{96} \\ & 40 \\ & \underline{32} \\ & 80 \\ & \underline{80} \\ & \times \end{array}$$

$= 0.5625$

(d) $\frac{1}{8}$

$$\begin{array}{r|l} 8 & 1.0 \quad 0.125 \\ & \underline{8} \\ & 20 \\ & \underline{16} \\ & 40 \\ & \underline{40} \\ & \times \end{array}$$

So, (a), (c) and (d) are terminating decimals.

6. (a) $\frac{15}{14}$

$$\begin{array}{r|l} 14 & 15.0 \quad 1.0714 \\ & \underline{14} \\ & 100 \\ & \underline{98} \\ & 20 \\ & \underline{14} \\ & 60 \\ & \underline{56} \\ & 4 \end{array}$$

1.0714... Yes (a)

(b) $\frac{23}{6}$

$$
\begin{array}{r|l}
6 & 23.0 \\
 & 18 \\
\hline
 & 50 \\
 & 48 \\
\hline
 & 20 \\
 & 18 \\
\hline
 & 2
\end{array}
\quad 3.83
$$

$= 3.8333.....$

(c) $\frac{-43}{45}$

$$
\begin{array}{r|l}
45 & 43.0 \\
 & 405 \\
\hline
 & 250 \\
 & 225 \\
\hline
 & 25
\end{array}
\quad .95
$$

$= 0.9555...$

(d) $\frac{-71}{80}$

$$
\begin{array}{r|l}
80 & 71.0 \\
 & 640 \\
\hline
 & 700 \\
 & 640 \\
\hline
 & 600 \\
 & 560 \\
\hline
 & 400 \\
 & 400 \\
\hline
 & \times
\end{array}
\quad .8875
$$

$= 0.8875$

So, (a), (b), (c) are non-terminating decimals

7. (a) $\frac{2}{7}$

$$
\begin{array}{r|l}
7 & 2.0 \\
 & 14 \\
\hline
 & 60 \\
 & 56 \\
\hline
 & 40 \\
 & 35 \\
\hline
 & 50 \\
 & 49 \\
\hline
 & 10 \\
 & 7 \\
\hline
 & 30 \\
 & 28 \\
\hline
 & 2 \\
\hline
\end{array}
\quad 0.285714
$$

$= 0.\overline{285714}$

(b) $\frac{1}{22}$

$$
\begin{array}{r|l}
22 & 1.00 \\
 & 88 \\
\hline
 & 120 \\
 & 110 \\
\hline
 & 100 \\
 & 88 \\
\hline
 & 12 \\
\hline
\end{array}
\quad .0454
$$

$= 0.0\overline{45}$

(c)

$$
\begin{array}{r|l}
15 & 16.0 \\
 & 15 \\
\hline
 & 100 \\
 & 90 \\
\hline
 & 10 \\
\hline
\end{array}
\quad 1.06
$$

$= 1.0\overline{6}$

8. (a) $0.\overline{25}$

Let $\frac{p}{q} = 0.25 = 0.252525$

$$100 \times \frac{p}{q} = 25.\overline{25} \quad \text{... (i)}$$

But $\frac{p}{q} = 0.\overline{25}$ ...(ii)

Subtracting (ii) by (i) 100 $\frac{p}{q} - \frac{p}{q} = 25.\overline{25} - 0.\overline{25}$

$$\frac{99p}{q} = 25; \frac{p}{q} = \frac{25}{99}$$

(b) $0.0\overline{64}$

Let $\frac{p}{q} = 0.06\bar{4}$

$$1000\frac{p}{q} = 64.\bar{4}$$

$$1000\frac{p}{q} = 6.\bar{4}$$

Subtracting (ii) from (i), we get

$$1000\frac{p}{q} - 100\frac{p}{q} = 58$$

$$900\frac{p}{q} = 58$$

$$\frac{p}{q} = \frac{58}{900} = \frac{29}{450}$$

(c) $0.\overline{120}$

$$\frac{p}{q} = 0.\overline{120}$$

$$1000\frac{p}{q} \Rightarrow 120.\overline{120} \qquad \text{...(ii)}$$

But $$\frac{p}{q} = 0.\overline{120} \qquad \text{...(i)}$$

Subtracting (ii) from (i)

$$1000\frac{p}{q} - \frac{p}{q} = 120$$

$$999\frac{p}{q} = 120$$

$$\frac{p}{q} = \frac{120}{999}$$

$$\frac{p}{q} = \frac{40}{333}$$

9. (a) 3.2

$$\frac{32}{10} = \frac{16}{5}$$

(b) 1.54

$$\frac{154 \div 2}{100 \div 2} \Rightarrow \frac{77}{50}$$

(c) $2.002 \Rightarrow \frac{2002 \div 2}{1000 \div 2} \Rightarrow \frac{1001}{500}$

(d) $0.3 \Rightarrow \frac{3}{10}$

10. (a) $3.\overline{6} + 0.\overline{9}$

$$\begin{array}{r} 3.6666 \\ +\ 0.9999 \\ \hline 4.6665 \end{array}$$

or 4.666 or 4.67

(b) $0.23 + 4.39$

$$\begin{array}{r} 0.2300 \\ +\ 4.3939 \\ \hline 4.6239 \end{array}$$

(c) $3.1\overline{83} + 0.24$

$$\begin{array}{r} 3.183383 \\ +\ 0.240000 \\ \hline 3.423383 \end{array}$$

(d)

$$\begin{array}{r} 4.536336 \\ +\ 6.534334 \\ \hline 11.070670 \end{array}$$

Check Your Mental Maths

1. (a) 5/–6; negative
   (b) –111/123 negative
   (c) –8/–19; positive
   (d) –7; negative
2. (a) Yes
   (b) Yes
   (c) Yes
   (d) Yes
3. (a) True
   (b) True
   (c) True
   (d) False
   (e) True
   (f) True
   (g) True
4. (a) $1.59 = \frac{159}{100}$
   (b) $8.5\overline{9}$

   Let $\frac{p}{q} = 8.5\overline{9}$

$$100 \times \frac{p}{q} = 859.\overline{9}$$

$$10 \times \frac{p}{q} = 85.\overline{9}$$

Subtracting (ii) from (i)

$$100\frac{p}{q} - 10\frac{p}{q} \Rightarrow 859.\overline{9} - 85.\overline{9}$$

$$90\frac{p}{q} \Rightarrow 774$$

$$\frac{p}{q} \Rightarrow \frac{774}{90}$$

$$\frac{774 \div 18}{90 \div 18} \Rightarrow \frac{43}{5}$$

(c) Let $\frac{p}{q} - 0.222 = 0.5$

$$10\frac{p}{q} \Rightarrow 2.\overline{2}$$

Subtracting

$$10\frac{p}{q} \Rightarrow 2.\overline{2} - 0.\overline{2}$$

$$\frac{9p}{q} = 2$$

$$\frac{p}{q} = \frac{2}{9}$$

Where $4.\overline{3}$

Let $\frac{p}{q} = 4.3333\ldots = 4.3$

$$10\frac{p}{q} = 43.\overline{3}$$

Subtracting we get

$$\frac{9p}{q} \Rightarrow 43.\bar{3} - 4.\bar{3}$$

$$\frac{9p}{q} \Rightarrow 39.0$$

$$\frac{p}{q} \Rightarrow \frac{39}{9}$$

Adding

$$\frac{2+39}{9} \Rightarrow \frac{41}{9}$$

(d) $8.\overline{62}$

$-\ 4.62$

4.00

(e) Rational

Multiple Choice Questions

1. (c) $\frac{9}{7}$

2. (a) like fractions

3. (a) 0 and 1

4. (b) zero

5. (c) $\frac{-6}{5}$

$$\frac{-4}{3} \times \frac{-5}{8} \Rightarrow \frac{-5}{6} \text{ ; reciprocal} = \frac{-6}{5}$$

6. (d) $\frac{60 \div 5}{-75 \div 5} \Rightarrow \frac{12 \div 3}{-15 \div 3} \Rightarrow \frac{4}{-5}$

7. (a) Boys in the class $= 20 \times \frac{3}{4}$

So, girls in the class are $= 20 - 15 = 5$

8. (b) Let the number be x

$$x \times \frac{36}{35} = \frac{-6}{5}$$

$$x = \frac{-6 \times 35}{36 \times 5}$$

$$x = \frac{-7}{6}$$

9. (a) 15.4, 7.3

10. (d) $0.2 \times 0.02 \times 0.002$

$$\frac{2}{10} \times \frac{2}{100} \times \frac{2}{1000}$$

$$= \frac{8}{1000000}$$

$$= 0.000008$$

3 Exponents and Powers

Exercise 3A

1. (a) $\left(\frac{2}{5}\right)^3 = \frac{2}{5} \times \frac{2}{5} \times \frac{2}{5} = \frac{8}{125}$

   (b) $\left(\frac{6}{-9}\right)^3 = \frac{6}{-9} \times \frac{6}{-9} \times \frac{6}{-9} = \frac{-216}{729}$

   (c) $\left(\frac{-3}{7}\right)^2 = \frac{-3}{7} \times \frac{-3}{7} = \frac{9}{49}$

   (d) $\left(\frac{8}{11}\right)^4 = \frac{8}{11} \times \frac{8}{11} \times \frac{8}{11} \times \frac{8}{11} = \frac{4096}{14641}$

2. (a) $\left(\frac{36}{81}\right) = \frac{6 \times 6}{9 \times 9} = \left(\frac{6}{9}\right)^2$

   (b) $\frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} = \left(\frac{5}{7}\right)^4$

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

3. (a) 15^6; Base $= 15$, exponent $= 6$

   (b) $\left(\frac{-1}{|2|}\right)^3$; base $= \frac{-1}{2}$, exponent $= 3$

   (c) 12^{-7}; base $= 12$, exponent $= -7$

   (d) 8^{x+y} base $= 8$, exponent $= x + y$

4. (a) $\left(\frac{-3}{7}\right)^2 \times \left(\frac{14}{3}\right)^2 = 4$

(b) $\left(\frac{1}{4}\right)^3 \times \left(\frac{16}{5}\right)^3$

$\frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} \times \frac{16}{5} \times \frac{16}{5} \times \frac{16}{5}$

$= \frac{64}{125}$

(c) $\left(\frac{2}{9}\right)^4 \div \left(\frac{4}{27}\right)^4$

$\frac{2}{9} \times \frac{2}{9} \times \frac{2}{9} \times \frac{2}{9} \times \frac{27}{4} \times \frac{27}{4} \times \frac{27}{4} \times \frac{27}{4} = \frac{81}{16}$

(d) $\left\{\left(\frac{-3}{4}\right)^2 - \left(\frac{1}{2}\right)^3\right\} \times 4^3$

$\left\{\left(\frac{-3}{4} \times \frac{-3}{4}\right) - \left(\frac{-1}{2} \times \frac{-1}{2} \times \frac{-1}{2}\right)\right\} \times 4 \times 4 \times 4$

$\left\{\frac{9}{16} - \frac{1}{8}\right\} \times 4 \times 4 \times 4$

$\left\{\frac{9-2}{16}\right\} \times 4 \times 4 \times 4 = \frac{7}{16} \times 4 \times 4 \times 4 = 28$

5. (a) $\left(\frac{2}{3}\right)^4 \div \left(\frac{4}{5}\right)^4$

$\frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{5}{4} \times \frac{5}{4} \times \frac{5}{4} \times \frac{5}{4}$

$\Rightarrow \frac{625}{1296}$

(b) $\left(\frac{3}{7}\right)^2 \times \left(\frac{-14}{5}\right)^3 \times \left(\frac{-5}{6}\right)^2$

$\frac{3}{7} \times \frac{3}{7} \times \frac{-14}{5} \times \frac{-14}{5} \times \frac{-14}{5} \times \frac{-5}{6} \times \frac{-5}{6}$

$\Rightarrow \frac{-14}{5}$

(c) $(-4)^3 \div \left(\frac{-2}{3}\right)^4$

$(-4) \times (-4) \times (-4) \times \frac{3}{-2} \times \frac{3}{-2} \times \frac{3}{-2} \times \frac{3}{-2}$

$\Rightarrow -324$

6. (a) $\frac{-1}{125} \Rightarrow \left(\frac{-1}{5}\right)^3$

(b) $\frac{16}{100} \Rightarrow \frac{4 \times 4}{10 \times 10} \Rightarrow \left(\frac{4}{10}\right)^2$ or $\left(\frac{2}{5}\right)^2$

(c) $\frac{144}{256} \Rightarrow \frac{12 \times 12}{16 \times 16} \Rightarrow \left(\frac{12}{16}\right)^2$ or $\left(\frac{3}{4}\right)^2$

(d) $\left(\frac{-8}{27}\right) \Rightarrow \frac{-2 \times -2 \times -2}{3 \times 3 \times 3} \Rightarrow \left(\frac{-2}{3}\right)^3$

7. (a) $(-3)^4 \Rightarrow -3 \times -3 \times -3 \times -3 \Rightarrow \left(\frac{-1}{3}\right)^4$

(b) $(-4)^3 \Rightarrow -4 \times -4 \times -4 \Rightarrow \left(\frac{-1}{4}\right)^3$

(c) $\left(\frac{-5}{9}\right)^2 \Rightarrow$ reciprocal $\left(\frac{-9}{5}\right)^2$

(d) $\left(\frac{-7}{11}\right)^5 \Rightarrow$ reciprocal $\left(\frac{-11}{7}\right)^8$

8. (a) $(-2)^3 \Rightarrow -8 \Rightarrow \frac{-1}{8}$

(b) $(-5)^2 \Rightarrow -5 \times -5 \Rightarrow 25 \Rightarrow \frac{1}{25}$

(c) $\left(\frac{-3}{11}\right)^2 \Rightarrow \frac{3 \times 3}{11 \times 11} \Rightarrow \frac{9}{121} \Rightarrow \frac{121}{9}$

(d) $\left(\frac{-3}{4}\right)^3 \Rightarrow \frac{-3 \times -3 \times -3}{4 \times 4 \times 4} \Rightarrow \frac{-27}{64}$ reciprocal $\Rightarrow \frac{-64}{24}$

Exercise 3B

1. (a) $7^{2x} \times 7^{3y}$

$\Rightarrow 7^{(2x+3y)}$

$\Rightarrow 7^{(2x+3y)}$

(b) $5^2 \times 5^4 \times 5^6 \Rightarrow 5^{(2+4+6)} \Rightarrow 5^{12}$

(c) $[-15^3]^4 \Rightarrow (-15)^{(4\times3)} \Rightarrow (-15)^{12}$

(d) $3^8 \div 3^5 \Rightarrow 3^{(8-5)} \Rightarrow 3^3$

(e) $\left(\frac{-1}{4}\right)^3 \div \left(\frac{-1}{4}\right)^4 \Rightarrow \left(\frac{-1}{4}\right)^{3-4} \Rightarrow \left(\frac{-1}{4}\right)^{-1}$ or $(-4)^1$

(f) $(a^m)^6 \Rightarrow (a)^{(m\times6)} \Rightarrow a^{6m}$

2. (a) $x^2 \times y^3 \times z^5 \times x \times y^4 \times z^2$

$x^{2+1} \times y^{3+4} \times z^{5+2}$

$x^3 y^7 z^7$

(b) $7^3 \times a \times b^2 \times 7 \times a^4$

$7^{3+1} \times a^{4+1} \times b^2$

$7^4 a^5 b^2$

3. (a) $\left(\frac{1}{2}\right)^3 \times \left(\frac{1}{2}\right)^4 = \left(\frac{1}{2}\right)^x$

$\left(\frac{1}{2}\right)^{3+4} = \left(\frac{1}{2}\right)^x$

$x = 3 + 4$

$x = 7$

(b) $\left(\frac{-1}{3}\right)^5 \times \left(\frac{-1}{3}\right)^8 = (-3)^x$

$\left(\frac{-1}{3}\right)^{5+8} = (-3)^x$

$(-3)^{-(5+8)} = (-3)^x$

$x = -13$

(c) $(4^3 \times 4^2) \div 4^4 = (4)^x$

$4^{3+2} \div 4^4$

$4^5 \div 4^4$

$4^{5-4} = 4 = (4)^x$

$x = 1$

(d) $\left(\frac{-5}{4}\right)^6 \div \left(\frac{-5}{4}\right)^4 = \left(\frac{-5}{4}\right)^x$

$\left(\frac{-5}{4}\right)^{6-4} = \left(\frac{-5}{4}\right)^x$

$+2 = x$

4. $\frac{3^3}{2} - \left(\frac{3}{2}\right)^3$

$\frac{27}{2} - \frac{27}{8}$

$\Rightarrow \frac{108 - 27}{8}$

$= \frac{81}{8}$

5. (a) $\left(\frac{-1}{3}\right)^0 \Rightarrow 1$

(b) $(2^0 + 5^0 + 7^0) \Rightarrow (1+1+1) = 3$

(c) $(4^0 - 3^0) \times 6^0 \Rightarrow (1-1) \times 1 \Rightarrow 0$

(d) $\frac{13^0 \times 14^0 \times 15^0}{13^0 + 14^0 + 15^0} \Rightarrow \frac{1 \times 1 \times 1}{1+1+1} \Rightarrow \frac{1}{3}$

6. (a) 7^3 and 3^7

$7^3 = 343$

$3^7 = 2187$

as $343 < 2187$

or $7^3 < 3^7$

(b) $\left(\frac{-3}{11}\right)^7$ and $\left[\left(\frac{-3}{4}\right)^3\right]^2 \Rightarrow \left(\frac{-3}{11}\right)^7$ and $\left(\frac{-3}{4}\right)^6$

negative rational number — positive rational number

So, $\left(\frac{-3}{11}\right)^7 < \left[\left(\frac{-3}{4}\right)^3\right]^2$

7. (a) $\left(\frac{-3}{4}\right)^{3} \times \left(\frac{-3}{4}\right)^{5}$

$\left(\frac{-3}{4}\right)^{3+5} \Rightarrow \left(\frac{-3}{4}\right)^{8}$

(b) $\left[\left(\frac{2}{3}\right)^{7}\right]^{3} \Rightarrow \left(\frac{2}{3}\right)^{21}$

(c) $\left(\frac{-9}{15}\right)^{12} \div \left(\frac{-9}{15}\right)^{4} \Rightarrow \left(\frac{-9}{15}\right)^{12-4} \Rightarrow \left(\frac{-9}{15}\right)^{8}$

(d) $\left(\frac{3}{5}\right)^{3} \times \left(\frac{-3}{5}\right)^{-2} \times \left(\frac{-3}{5}\right)^{-4}$

$\left(\frac{3}{5}\right)^{3} \times \left(\frac{-3}{5}\right)^{-6} \Rightarrow \left(\frac{3}{5}\right)^{-3} \Rightarrow \left(\frac{5}{3}\right)^{3}$

8. (a) $a^{m} \times a^{n} = a^{m+n}$; True

(b) $a^{m} \div a^{n} = a^{m \div n}$; False

(c) $(a^{m})^{n} = a^{mn}$; True

(d) $a^{m} \div a^{m} = 7$

$a^{m-m} = a^{0} = 1$; True

9. Let one number is x

$(-3)^{-1} \times x \Rightarrow (-5)^{-1}$

$\left(\frac{-1}{3}\right) \times x = \left(\frac{-1}{5}\right)$

$x \Rightarrow \frac{-1}{5} \times -3$

$x = \frac{3}{5}$

Exercise 3C

1. (a) $\left(\frac{5}{7}\right)^{-5} \Rightarrow \left[\left(\frac{5}{7}\right)^{-1}\right]^{5} \Rightarrow \left(\frac{7}{5}\right)^{5}$

   (b) $\left(\frac{-8}{9}\right)^{-3} \Rightarrow \left(\frac{-9}{8}\right)^{3}$

2. (a) $\left(\frac{2}{5}\right)^{-4} \div \left(\frac{4}{5}\right)^{-5}$

   $\left(\frac{5}{2}\right)^{4} \div \left(\frac{5}{4}\right)^{5}$

   $\frac{5\times5\times5\times5}{2\times2\times2\times2} \times \frac{4\times4\times4\times4\times4}{5\times5\times5\times5\times5}$

   $\Rightarrow \frac{64}{5}$

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

   $\left[\frac{3}{7}\right]^{-1+(-2)+4}$

   $\left[\frac{3}{7}\right]^{1} = \frac{3}{7}$

3. (a) 3.8

   3.8×10^{0}

   (b) 6700

   6.7×10^{3}

(c) 54300

5.43×10^4

(d) 92 lakh = 9200000

9.2×10^6

(e) 0.000008

8×10^{-6}

(f) 0.000027

2.7×10^{-5}

(g) 5.34

5.34×10^0

4. (a) $3.5 \times 10^2 = 350$

(b) $5.81 \times 10^{-4} = 0.000581$

(c) $2.9275 = 2.9275$

(d) $0.024 \times 10^3 = 24$

(e) $6.007 \times 10^{-7} = 0.0000006007$

(f) $1.0009 \times 10^8 = 100090000$

5. 300000000 km/sec

in scientific notation = 3×10^8 km/sec

6. 384400000 m away from earth

or 3.844×10^8

7. Sound travels 3.3×10^4 cm/sec

or 33000 cm/sec

8. No, 56.3×10^6 is not in scientific notation

But 5.63×10^7 is correct one.

9. 0.00034×0.000078

   2.652×10^{-8}

Check Your Mental Math IQ

1. $(-4)^0 - (-3)^0 = \text{Zero}$

   $1 - 1 = 0$

2. $\left(\frac{1}{3}\right)^0 = 1$

3. $\left(\frac{-2}{3}\right)^2 = \frac{4}{9}$

4. $\left(\frac{-1}{7}\right)^3 = \frac{-1}{343}$

5. $\left(\frac{1}{5}\right)^4 = (5)^4 = 625$

6. $\frac{3^2 \times 2^3 \times 4}{3 \times 16 \times 2} \Rightarrow \frac{3 \times 3 \times 2 \times 2 \times 2 \times 4}{3 \times 16 \times 2} = 3$

7. $(1)^0 \times 2^0 \times 3^0 \times 4^0 = \text{I}$

Multiple Choice Questions

1. $25 \div 25 = 1$ (b)

2. $\left(\frac{1}{2}\right)^3 \times 4$ is $\frac{1 \times 4}{8} = \frac{1}{2}$ reciprocal $\Rightarrow \frac{2}{1}$ (c)

3. $\left[\left(\frac{3}{5}\right)^0\right]^4 \Rightarrow (1)^4 \Rightarrow 1$ (c)

4. $5^{(x-1)} = (5)^4$

$x - 1 = 4 \Rightarrow x = 5$ (c)

5. $4^{4x+4} = 1$

as $(4)^0 = 1$; so $4^{4x+4} = 4^0$

$4x + 4 = 0$

$x = -1$ (b)

6. (a) $\left[\left(\frac{2}{5}\right)^2\right]^5 = \left(\frac{2}{5}\right)^{5x}$

$\left(\frac{2}{5}\right)^{10} = \left(\frac{2}{5}\right)^{5x}$

$10x = 5x$

$2 = x;$ (a)

7. $0.00003 \times 10^6 = 30$

(a) greater than 1

8. 6.4×10^4

6400 (b)

4 ALGEBRA

Algebraic Expressions

Exercise 4A

1. According to question :
   $6 \times x = (q - p)$
   $6x = (q - p)$
2. Distance $= \text{speed} \times \text{time}$
   $= 40 \text{ km/h} \times x \text{ h}$
   $= 40x \text{ km}$
3. 1 pen cost = ₹5
   x pen cost = ₹5x
   1 pencil cost = ₹2
   y pencil cost = ₹2y
   Total cost = ₹ $(5x + 2y)$
4. (a) $(q - 2p)$ (b) $(y + z) - x$
   (c) $a + 7$ (d) $\frac{yz}{8}$
7. 1 banana weight = 98 gm
   x banana weight = 98 gm × x
   1 guava weight = 60 gm
   y guava weight = 60 × y
   Total weight = $98x + 60y$

Exercise 4B

1. (a) $a^2 - b^2$ = binomial
   (b) $xy + yz + zx$ = trinomial
   (c) $67a$ = monominal
   (d) $2x - z + 4$ = trinomial
   (e) $ax^3 + bx^2 + x + d$ = quadrinomial
   (f) $p^2q + qr + r^3q$ = trinomial

2. (a) $2x + 3y - 5$

$2x, 3y, -5$

(b) $3x^5 + 5y^4 - 7x^2y$

$3x^5, 5y^4, -7x^2y$

(c) $ab - a - b$

$ab, -a, -b$

(d) $-4x + 5y$

$-4x, 5y$

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

(b) $9 \times 9 \times 9 \ldots .12 \text{ times} = (9)^{12}$

(c) $6 \times a \times a \times b \times b \times b = 6a^2b^3$

(d) $7 \times a \times b \times b \times b \times c \times c \times c = 7ab^3c^3$

4. Coefficient of p

(a) $-2pq = -2q$ (b) $pqr = qr$

(c) $8pr^2 = 8r^2$ (d) $-9pqr^2 = -9qr^2$

5. (a) $-x^2 + 3 - y^2 = -1, 3, -1$

(b) $x^3 - 7x^2y + 5xy^2 - 2 = 1, -7, 5, -2$

6. (a) $yz, \frac{yz}{2}$

(b) $29x^2$ and $43x^2$; $-38xy, 54xy$

(c) $-y^2x^2, x^2y^2$

(d) $4mn, -10mn; -2no, 3no; 6mo, -5mo$

7. (a) $x^2y^2, +2xy$; unlike terms $x^2, y^2, +2xy$

(b) $8x^4y, -7x^3y^2, +4/3x^2, yz^2 =$ unlike terms

(c) $3y, -2y, +7y, -2y =$ like terms

(d) $4xy, 2x^2y, -3xy^2 =$ unlike term

(e) $ab^2c, a^4b^2c, abc =$ unlike terms

(f) $5abc^2, -4abc^2, 8abc^2 =$ like terms

8. Degree (highest power of the variable)

(a) $abc + a^2bc + ab^2c^3 + abc^2 = 6$

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

(c) $3y^2 - 2y^5 + 6y^4 + 21y + 7 = 5$

(d) $\frac{1}{2}x^3 - \frac{3}{7}x^2y^2 + \frac{5}{9}xy + z = 4$

Exercise 4C

1. (a) $4xy + 2xy + 5xy = 11xy$

   (b) $2x + 3y + z + 2x - y - z = 4x + 2y$

   (c) $6x^2 - 7x + 1 - 3x^2 + 4x + 2 + x^2 - x - 3 = 4x^2 - 4x$

   (d) $9mn - 7mn + 3 - 8 + 12mn + 2 - 2mn - 3 = 12mn - 4$

   (e) $5a^2 + 7a + 3 + 12a^2 - 3a + 8 + 16a^2 - 4a + 7 = 33a^2 + 18$

2. (a) $a^3 + 2a^2b + 6ab^2 - b^3$ from $b^3 - 3ab^2 - 4a^2b$

   $b^3 - 3ab^2 - 4a^2b - a^3 - 2a^2b - 6ab^2 + b^3$

   $2b^3 - 9ab^2 - 6a^2b^2 - a^3$

   (b) $-7x^2 + 7x + 2 - 6x^2 + 3x - 4$

   $-13x^2, +10x - 2$

   (c) $5p^2 + 3q^2 - 9q - 4pq + 5q^2 + 3p^2$

   $8p^2 + 8q^2 - 9q - 4pq$

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

   $2b$

3. Total length of two ropes $= 4x + 3 + 6x - 7$

   $(10x - 4)$ metres

4. Perimeter $= 2(l + b)$

   $= 2(3x + 2y + 7x + y)$

   $= 2(10x + 3y)$

   $= 20x + 6y$

5. Perimeter $= 4 \times$ side

   $= 4 \times (5x + 4)$

   $= 20x + 16$

6. $6x^2 + 5x + 8$

   $2x^2 - 4x + 3$ were girls

   boys $= 6x^2 + 5x + 8 - 2x^2 + 4x - 3$

   $= 4x^2 + 9x + 5$

7. Let the added term be 'x'.

$a^2 + 2ab + b^2 + x = 4ab + b^2$

$x = 4ab + b^2 - b^2 - a^2 - 2ab$

$x = -a^2 + 2ab$

8. Let the subtrahend number be x.

$2m + 8n + 10 + 3m - 7n - 16 = x$

$5m + n - 6 = x$

So, $2m + 8n + 10 - x = -3m + 7n + 16$

9. $3x + 2y + 3z + 3x - 4y + 5z - 6x - 7y + 2z - 9y + 10z$

10. $2a^2 - 7a + 5$ less than $a^3 - 3a^2 + 2a - 3$

$a^3 - 3a^2 + 2a - 3 - 2a^2 + 7a - 5$

$a^3 - 5a^2 + 9a - 8$

11. $-2x^2 - 2y^2 + 3xy + 10$ Subtracted from $4x^2 - 5y^2 + 6xy + 20$

$4x^2 - 5y^2 + 6xy + 20 + 2x^2 + 2y^2 - 3xy - 10$

$6x^2 - 3y^2 + 3xy + 10$

12. $3a - 5b + 3c + 2a + 4b - 5c - 4a + b + c - 3$

$= 1a - c - 3$

Exercise 4D

1. $3x - 5 = 7$

$3x = 7 + 5$

Divide both sides by 3

We get $x = 4$

Check : $3 \times 4 - 5$

$12 - 5 = 7$

L.H.S. = R.H.S. hence verified.

2. $3y - 15 = 16$

$3y = 6 + 15$, $3y = 21$

Dividing both sides by 3

$y = 7$

Check : $3 \times 7 - 15 = 21 - 15 = 6$

L.H.S. = R.H.S. Hence verified

3. $8x = 20 + 3x$

$8x - 3x = 20$

$5x = 20$

Dividing both side by 5

$x = 4$

Check : $8 \times 4 = 32 = 20 + 3 \times 4 = 32$

L.H.S. = R.H.S. Hence verified.

4. $8x + 3 = 21$

$8x = 21 - 3$

$8x = 18$

Dividing both side by 8

$$x = \frac{18 \div 2}{8 \div 2} = \frac{9}{4}$$

Check : $\frac{8 \times 9}{4} + 3 = 18 + 3 = 21$

$21 = 21$

L.H.S. = R.H.S. Hence verified

5. $2x - 10 = -3x$

$2x + 3x = 10$

$5x = 10$

Dividing both sides by 5

$x = 2$

Check : $2 \times 2 - 10 = -3 \times 2$

$4 - 10 = -6$

$-6 = -6$

L.H.S. = R.H.S. Hence verified.

6. $3x - 2 = 10$

$3x = 12$

Dividing both side by 3

$x = 4$

Check : $3 \times 4 - 2 = 10$

$12 - 2 = 10$

L.H.S. = R.H.S. Hence verified.

7. $5x-(3x-1)=(x-4)$

$5x-3x+1=x-4$

$2x+1=x-4$

$2x-x=-4-1$

$x=-5$

Check : $5\times-5-(3\times-5-1)=(-5-4)$

$-25+16$

$-9=-9$

L.H.S. = R.H.S. Hence verified

8. $3(3x+1)=-2x$

$9x+3=-2x$

$9x+2x=-3$

$11x=-3$

$$x=\frac{-3}{11}$$

Checking : $3\left(3\times\frac{-3}{11}+1\right)=-2\times\frac{-3}{11}$

L.C.M. = 11

$$3\left(\frac{-9+11}{11}\right)=\frac{6}{11}$$

$$\frac{2}{11}\times3=\frac{6}{11}$$

$$\frac{6}{11}=\frac{6}{11}$$

L.H.S. = R.H.S. Hence verified

9. $9(5x-3)=16x$

$45x-27=16x$

$45x=16x+27$

$45x-16x=27$

$29x=27$

$$x = \frac{27}{29}$$

L.H.S. $= 9\left(5 \times \frac{27}{29} - 3\right)$

$= 9\left(\frac{135 - 3 \times 29}{29}\right)$

$= 9\left(\frac{135 - 87}{29}\right)$

$= \frac{9 \times 48}{29} \Rightarrow \frac{432}{29}$

R.H.S. $= \frac{16 \times 27}{29} \Rightarrow \frac{432}{29}$

L.H.S. = R.H.S. Hence verified

10. $3(5 + 3x) = 5(3 - 2x)$

$15 + 9x = 15 - 10x$

$19x = 0$

$x = 0$

Checking : L.H.S. $3(5) = 15$

R.H.S. $5(3) = 15$

L.H.S. = R.H.S. Hence verified

11. $\frac{2}{3}x + 1 = \frac{7}{3}$

$\frac{2}{3}x = \frac{7}{3} - 1$

$\frac{2x}{3} = \frac{4}{3}$

by 3 multiply and dividing by 2

$x = 2$

Checking : L.H.S. $= \frac{2}{3} \times 2 + 1 = \frac{4}{3} + 1 = \frac{4+3}{3} = \frac{7}{3}$

R.H.S. $= \frac{7}{3}$

L.H.S. = R.H.S. Hence verified.

12. $\frac{1}{4}x + \frac{1}{6}x = x - 7$

$\frac{1}{4}x + \frac{1}{6}x - x = -7$

L.C.M. = 12

$$\frac{3x + 2x - 12x}{12} = -7$$

$$\frac{-7x}{12} = -7$$

Dividing by –7 and multiply by 12

$$x = +12$$

Checking : x = 12

L.H.S. $= \frac{1}{4} \times 12 + \frac{1}{6} \times 12 = 3 + 2 = 5$

R.H.S. $= 12 - 7 = 5$

L.H.S. = R.H.S. Hence verified

13. $\frac{y}{3} - \frac{7}{2} = \frac{-y}{4}$

Multiply both side by 12

$4x - 42 = -3y$

$7y = 42$

Divide both side by 7 $\Rightarrow$ y = 6

Checking : L.H.S. $= \frac{6}{3} - \frac{7}{2} = \frac{4-7}{2}$ L.C.M. = 2

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

R.H.S. $= \frac{-6}{2} = \frac{-3}{2}$

L.H.S. = R.H.S. Hence verified.

14. $3x + \frac{2}{3} = 2x + 1$

9x + 2 = 6x + 3 (as multipling both side by 3)

3x = 1

Divide both side by 3

$x = \frac{1}{3}$

Checking : L.H.S. $= 3 \times \frac{1}{3} + \frac{2}{3} = \frac{5}{3}$

R.H.S. $= 2 \times \frac{1}{3} + 1 = \frac{2}{3} + 1 = \frac{2+3}{3} = \frac{5}{3}$

15. $2y - \frac{5}{3} = \frac{7y}{6} + \frac{5}{6}$

Multipling both side by 6

12y – 10 = 7y + 5

12y – 7y = 5 + 10

5y = 15

Divide by 5

y = 3

Checking : L.H.S. $= 2 \times 3 - \frac{5}{3} = \frac{6-5}{3} = \frac{18-5}{3} = \frac{13}{3}$

R.H.S. $= \frac{7\times3}{6}+\frac{5}{6}=\frac{21+5}{6}=\frac{26\div2}{6\div2}=\frac{13}{3}$

L.H.S. = R.H.S. (Hence verified)

16. $0.6x + 4/5 = 0.28x + 1.16$

$0.60x - 0.28x = 1.16 - 0.80$

$0.32x = 0.36$

$$x=\frac{0.36}{0.32}=\frac{36}{32}=\frac{9}{8}=1.125$$

Checking $0.6\times1.125+\frac{4}{5}=0.6750+0.8000$

$= 1.4750 = \text{L.H.S.}$

$0.28\times1.125+1.16=0.31500+1.1600$

$= 1.4750 = \text{R.H.S.}$

L.H.S. = R.H.S. (Hence verified)

17. $4(3x-2)+5x=6(2x+8)-12$

$12x-8+5x=12x+48+(-12)$

$17x-8=12x+36$

$5x=44$

Dividing both side by 5

$$x=\frac{44}{5}$$

Checking : L.H.S. $= \left(3\times\frac{44}{5}-2\right)+5\times\frac{44}{5}$

$\frac{4\times(132-10)}{5}+44$

$\frac{488+220}{5}=\frac{708}{5}$

R.H.S. $= 6\left(2\times\frac{44}{5}+8\right)-\frac{12}{1}$

$6\left(\frac{88+40}{5}\right)-\frac{12}{1}$

$$\frac{6\times128}{5}-\frac{12}{1}$$

$$\frac{768-60}{5}$$

$$=\frac{708}{5}$$

L.H.S. = R.H.S. (Hence verified)

18. $3(7x+3)=4(6x+12)$

$21x+9=24x+48$

$-48+9=3x$

$-39=3x$

Dividing both side by 3

$-13=x$

Checking : $3(7x-13+3)$

$3(-91+3) \quad =3\times-88$

$=-264$

R.H.S. $4(6\times-13+12)$

$4(-78+12)$

$4(-66) \quad =-264$

L.H.S. = R.H.S. Hence verified

19. $-(7-2y)-11(11-2y)=0$

$-7+2y-121+22y=0$

$24y=128$

Dividing by 24

$$y=\frac{128}{24}=\frac{16}{3}=5\frac{1}{3}$$

Check : L.H.S. $= -\left(-7-2\times\frac{16}{3}\right)-11\left(11-\frac{2\times16}{3}\right)$

$$\left(\frac{-7}{1}+\frac{32}{3}\right)-\left(\frac{121}{1}-\frac{352}{3}\right)$$

$$\left(\frac{-21+32}{3}\right)-\left(\frac{363-352}{3}\right)$$

$$\frac{11}{3}-\frac{11}{3}=0$$

R.H.S. $=0$

L.H.S. = R.H.S. Hence Verified

20. $3x+\frac{2}{3}=2x+1$

Multipling both sides by 3

$9x+2=6x+3$

$3x=1$

$$x=\frac{1}{3}$$

Checking: L.H.S. $= 3\times\frac{1}{3}+\frac{2}{3}=\frac{5}{3}$

R.H.S. $= 2\times\frac{1}{3}+1=\frac{5}{3}$

L.H.S. = R.H.S. (Hence verified)

21. $\frac{y+6}{4}+\frac{y-3}{5}=\frac{5y-4}{8}$

Multipling both side by 40

$10y+60+8y-24=25y-20$

$18y-25y=-56$

$-7y=-56$

Divide both side by 7

$y=8$

Checking: L.H.S. $= \frac{8+6}{4}+\frac{8-3}{5}=\frac{14}{4}+\frac{5}{5}$

$\frac{7}{2}+1=\frac{7+2}{2}=\frac{9}{2}$

R.H.S. $= \frac{5\times8-4}{8}=\frac{40-4}{8}=\frac{36}{8}=\frac{9}{2}$

L.H.S. = R.H.S. (Hence verified)

22. $\frac{2x-3}{35}-\frac{1}{10}=\frac{4}{1}-\frac{3x}{28}$

$\frac{4x-6-7}{70}=\frac{112-3x}{28}$

$\frac{4x-13}{70}=\frac{112-3x}{28}$

$\frac{8x-26=560-15x}{140}$

$8x+15x=560+26$

$23x=586$

$x=\frac{586}{23}$

Check : L.H.S. $=\frac{2\times586}{23\times35}-\frac{3}{35}-\frac{1}{10}$

$\frac{2344-138-161}{1610}=\frac{2045}{1610}=\frac{409}{322}$

R.H.S. $=\frac{4}{1}-\frac{3\times582}{23\times28}$

$\frac{2576-1758}{644}=\frac{818}{644}=\frac{409}{322}$

L.H.S. = R.H.S. (Hence verified)

23. $\frac{x}{3}+5-\frac{x}{6}+\frac{x}{4}=0$

$\frac{4x-2x+3x}{12}=-5$

$5x=-5\times12$

$x=\frac{-5\times12}{5}$ $\quad x=-12$

Check : L.H.S. $= \frac{12}{3} + 5 + \frac{12}{6} - \frac{12}{4}$

$= -4 + 5 + 2 - 3 = 0$

R.H.S. $= 0$

24. $\frac{5x-3}{2x} = \frac{8}{9}$

Multiplying both side by 9 and divide it by 8

$\frac{45x-27}{16x} = 1$

$45x - 27 = 16x$

$45x - 16x = 27$

$29x = 27$

$x = \frac{27}{29}$

Checking : L.H.S. $= \frac{5 \times \frac{27}{29} - 3}{2 \times \frac{27}{29}} = \frac{135-87}{54}$

$\frac{48 \div 6}{54 \div 6} = \frac{8}{9}$

R.H.S. $= \frac{8}{9}$

L.H.S. = R.H.S. (Hence Verified)

25. $\frac{3(m-4)}{15} - \frac{(m-5)}{10} = \frac{2(3-m)}{5}$

$\frac{3(m-4)}{15} - \frac{(m-5)}{10} = \frac{2(3-m)}{5} = 0$

As L.C.M. = 30

$$\frac{6m-24-3m+15-36+12m}{30}=0$$

$15m=45$

$m=3$

Checking :

$$\frac{-3}{15}+\frac{2}{10}=\frac{-1}{5}+\frac{1}{5}=0$$

L.H.S. = R.H.S. (Hence verified)

Exercise 4E

1. Let two number by x and y

$x+y=20$ ...(i)

$x-y=10$ ...(ii)

Adding $2x=30$

$x=15$

Putting in equation (i)

$15+y=20$

$y=20-15$

$y=5$

2. By 9

$$\text{L.H.S.}=\frac{4}{3}+5=\frac{9}{3}+5=8$$

R.H.S. = 8

L.H.S. = R.H.S.

3. Let a number be x.

then other number, $x+1, x+2$

$x+x+1+x+2=72$

$3x=72$

$3x=72-3$

$3x=69$

$$x=\frac{69}{3}$$

$x = 23$

The numbers are $= 23, 24, 25$

4. Let the base angles be x, x

The rest angle be $\frac{x}{2}$

So,

$$\frac{x}{1} + \frac{x}{1} + \frac{x}{2} = 180$$

$$\frac{5x}{2} = 180$$

$$5x = 360$$

$$x = 72$$

and the vertex angle is $\frac{72}{2} = 36°$

$36°, 72°, 72°$

5. Perimeter $= 234$ cm

Let breadth is x the

ATQ

$x + 3 =$ length

So, Perimeter $= 2(l + b)$

$234 = 2(x + x + 3)$

$234 = 4x + 6$

$228 = 4x$

$$\frac{228}{4} = x$$

$$x = 57$$

The breadth is $57 + 3 = 60$ cm

6. $3x + 7 = 35 - x$

$3x + x = 35 - 7$

$4x = 28$

$$x = \frac{28}{4}$$

$x = 7$

Checking : L.H.S. $= 3 \times 7 + 7 = 28$

R.H.S. $= 35 - 7 = 28$

L.H.S. = R.H.S.

7. Let the number be x

$$\frac{1}{3}x - \frac{1}{4} \times x = 12$$

$$\frac{x}{12} = 12$$

$$x = 144$$

8. Let the denominator is 'x'

$x - 4 =$ numerator

$$\frac{x-4+1}{x+1} = \frac{1}{2}$$

$$\frac{x-3}{x+1} = \frac{1}{2}$$

$2x - 6 = x + 1$

$x = 7$

Numerator $= 7 - 4 = 3$

Fraction $= \frac{3}{7}$

9. Let the Jim age = x

Then Tom age be = 3x

After 3 years

$2(x + 3) = (3x + 3)$

$2x + 6 = 3x + 3$

$3 = x$

So, Jim age x = 3 years

Then Tom's age will be $= 3 \times 3 = 9$ years

10. For $x=2, a=2, y=-3, b=3, z=-2$

(a) $3\times(2)^2+(2)^2-(-3)^2=12+4-9=7$

(b) $(2)^3-(-3)^3+(-2)^3=8+27-8=27$

(c) $(2)^3+(-3)^3+3(2)(-3)(-2)+(2\times3)=8-27+36+6=23$

(d) b^3+3+a^3-2xyz

$(3)^3+3+(2)^3-2(2)(-3)(-2)=27+3+8-24=14$

Check Your Mental Test IQ

1. (a) $-4y$ (b) y^2 (c) $-3y^3$
2. degree = 0 3. power 4. constant
5. two terms 6. 6

Multiple Choice Questions (MCQ)

1. (c) trinominal expression 2. (c) Constant term
3. (b) 12 as $3\times2+2\times3=12$
4. (b) $0-(5a+4b-3)$ *i.e.* $-5a-4b+3$
5. $4x-4=5+x$

   $4x-x=5+4$

   $3x=9=x=3$ (a) 3
6. (b) Let one number be x, then other is 5x.

   Difference $5x-x=20$

   $4x=20=x=5$

   The other is $5\times5=25$
7. (b) Let the number be x and x + 1

   $x+x+1=69$

   $2x+1=69$

   $2x=68,\quad x=34$

   Other is 35
8. (a) Let the brother age is x

   Meenal age is $=x+5$

   $x+x+5=25$

   $2x+5=25$

   $2x=20=x=10$

   $10+5=15$ years

5 COMMERCIAL MATHEMATICS

Ratio and Proportion

Exercise 5a

1. (a) 10 m to 25 cm

1 m = 100 cm

10 m = 1000 cm

$$\text{Ratio} = \frac{1000}{25} = \frac{40}{1}$$

$$= 40 : 1$$

(b) 15 kg to 210 kg

$$\frac{15 \div 3}{210 \div 3} = \frac{50 \div 5}{70 \div 5} = \frac{1}{14} \text{ or } 1 : 14$$

(c) 8 minutes to 120 seconds

1 minute = 60 seconds

$8 \times 60 = 480$

$$\frac{480}{120} = \frac{4}{1} = 4 : 1$$

(d) 21 days to 2 weeks

1 week = 7 days

2 weeks = 14 days

$$\frac{21 \div 7}{14 \div 7} = \frac{3}{2} = 3 : 2$$

2. Total 35; Passed = 30; failed = 5

(a) $\frac{30}{35}$ or $6 : 7$ (b) $\frac{30}{35}$ or $6 : 1$

(c) $\frac{5}{30}$ or $1 : 6$ (d) $\frac{5}{35}$ or $1 : 7$

3. (a) $\frac{91 \div 13}{52 \div 13} = \frac{7}{4}$ (b) $\frac{225 \div 75}{375 \div 75} = \frac{3}{5}$

(c) $\frac{900 \div 300}{2100 \div 300} = \frac{3}{7}$ (d) $\frac{250 \div 250}{2000 \div 250} = \frac{1}{8}$

(e) $\frac{186 \div 31}{403 \div 31} = \frac{6}{13}$ (f) $\frac{384 \div 128}{640 \div 128} = \frac{3}{5}$

4. (a) $\frac{3}{4} or \frac{4}{5}$

$\frac{3 \times 5}{4 \times 5} \& \frac{4 \times 4}{5 \times 4}$

$= \frac{15}{20} < \frac{16}{20}$

So, $\frac{4}{5}$ is greater.

(b) $\frac{6}{7} or \frac{15}{21}$

$\frac{6 \times 3}{7 \times 3} = \frac{18}{21} > \frac{15}{21}$

So, $\frac{6}{7}$ is greater.

(c) $\frac{3}{7} or \frac{5}{9}$

$\frac{3 \times 9}{7 \times 9} \square \frac{5 \times 7}{9 \times 7}$

$\frac{27}{63} < \frac{35}{63}$

So, $\frac{5}{9}$ is greater.

(d) $\frac{11}{18} or \frac{7}{12}$

$\frac{11\times2}{18\times2}=\frac{22}{36} or \frac{7\times3}{12\times3}=\frac{21}{36}$

$\frac{22}{36}>\frac{21}{36}$

So, $\frac{11}{18}$ is greater.

(e) $\frac{21}{24} or \frac{5}{18}$

$\frac{21\times3}{24\times3}=\frac{63}{72}$ □ $\frac{5\times4}{18\times4}=\frac{20}{72}$

$\frac{63}{72}>\frac{20}{72}$

So, $\frac{21}{24}$ is greater.

(f) $\frac{17}{21} or \frac{9}{14}$

$\frac{17\times2}{21\times2}=\frac{34}{42}$ □ $\frac{9\times3}{14\times3}=\frac{27}{42}$

$\frac{34}{42}>\frac{27}{42}$

So, $\frac{17}{21}$ is greater.

5. Total = 40; male = 16; female = 24

(a) $\frac{24\div4}{16\div4}=\frac{6}{4}=\frac{3}{2}$ (b) $\frac{24\div8}{40\div8}=\frac{3}{5}$

(c) $\frac{16\div8}{40\div8}=\frac{2}{5}$

6. Let Khushboo got ₹x

then honey got = 1250 – x

$$\frac{x}{250-x} = \frac{2}{3}$$

$3x = 2500 - 2x$

$5x = 2500$

$x = 500$

$1250 - 500 = 750$

500, 750

7. 40, 30, 60, 45

$$\frac{40}{30}, \frac{60}{45}$$

Product of extremes = $40 \times 45 = 1800$

Product of means = $30 \times 60 = 1800$

both are equal, so they are in proportion.

8. Anuj income = ₹ 5000

spend = ₹ 4500

save = ₹ 500

Amol income = ₹ 6000

spend = ₹ 4500

save = ₹ 1500

(a) $\frac{5000}{6000} = \frac{5}{6}$

(b) $\frac{500}{1500} = \frac{1}{3}$

(c) $\frac{5000}{500} = \frac{10}{1}$

(d) $\frac{6000}{1500} = \frac{4}{1}$

9. (a) x : 6 = 55 : 11

$$\frac{x}{6} = \frac{55}{11}$$

$x = 30$

(b) $\frac{18}{x} = \frac{27}{3}$

$2 = x$

(c) $\frac{7}{14} = \frac{15}{x}$

$x = 30$

(d) $\frac{6}{9} = \frac{x}{12}$

$8 = x$

10. Width = 30 m

$\frac{length}{30} = \frac{5}{2} \Rightarrow length = \frac{5 \times 30}{2}$

Length = $5 \times 15 = 75$m

11. Let the ratio be 3x, 2x, 1x

$3x + 2x + x = 36$

$6x = 36$

$x = 6$

So, sides are $3 \times 6, 3 \times 6, 3 \times 1 = 18, 12, 3$ cms

12. 12 : x :: 8 : 14

$\frac{12}{x} = \frac{8}{14}$

$\frac{12 \times 14}{8} = x$

$x = 21$

13. Total students = 720

Boys = 280

Girls = 440

(a) $\frac{280 \div 40}{440 \div 40} = \frac{7}{11}$ (b) $\frac{280 \div 40}{720 \div 40} = \frac{7}{18}$

(c) $\frac{720 \div 40}{440 \div 40} = \frac{18}{11}$

14. $\frac{3}{x} = \frac{x}{12}$

$36 = x^2$

$x = 6$

15. $\frac{income}{\exp enditure} = \frac{9}{8}$

Let company spend = 6400

$$\frac{6400 + x}{6400} = \frac{9}{8}$$

$51200 + 8x = 57600$

$8x = 6400$

$x = 800$

Save ₹ 800, income = 6400 + 800 = ₹ 7200

Check Your Mental Maths IQ

1. $\frac{96 \div 96}{768 \div 96} = \frac{1}{8}$

2. $\frac{2}{3} and \frac{3}{4}$

$\frac{2 \times 4}{3 \times 4} = \frac{8}{12} and \frac{3 \times 3}{4 \times 3} = \frac{9}{12}$

No, they are not equivalent.

3. $\frac{a}{b} = \frac{4}{5}, \frac{b}{c} = \frac{15}{27}$

$$\frac{5a}{4} = b \quad \text{but in} \quad \frac{5a}{4} = \frac{15}{27}$$

$$\frac{a}{c} = \frac{15 \times 4}{27 \times 5}$$

$$\frac{a}{c} = \frac{4}{9}$$

a : c = 4 : 9

4. $\frac{18 \div 6}{24 \div 6} = \frac{3}{4}$

$$\frac{3 \times 4}{4 \times 4} = \frac{12}{16}$$

5. $\frac{36}{42} = \frac{6}{7}$

as product of extreme $36 \times 7 = 252$

product of means $= 42 \times 6 = 252$

Yes, they are in proportion.

6. $\frac{5}{x} = \frac{75}{30}$

$$\frac{5 \times 30}{75} = x$$

x = 2

7. Let height of pole = x

$$\frac{15}{x} = \frac{45}{60}$$

$$\frac{15 \times 20}{45} = x$$

Height of pole x = 20 m

Multiple Choice Questions (MCQ)

1. $\frac{3}{4}, \frac{4}{5}, \frac{6}{7}$

   $\frac{3\times35}{4\times35}=\frac{105}{140}; \frac{4\times28}{5\times28}=\frac{112}{140}; \frac{6\times20}{7\times20}=\frac{120}{140}$

   $\frac{105}{140}, \frac{112}{140}, \frac{120}{140}$

   So, $\frac{6}{7}$ is greater (c)

2. $\frac{8}{x}=\frac{3}{9}$

   $24 = x$ (b)

3. $9, 15, x$

   $\frac{9}{15}=\frac{15}{x}$

   $x=\frac{15\times5}{3}$

   $x = 25$ (a)

4. $4, x, 9$

   $\frac{4}{x}=\frac{x}{9}$ $\quad 36=x^2$ $\quad x=6$ (a)

5. $\frac{a}{b}=\frac{4}{5}, \frac{b}{c}=\frac{6}{7}$

   $\frac{5a}{4}=b$ but in $\frac{5a}{4\times c}=\frac{6}{7}$

   $\frac{a}{c}=\frac{6\times4}{7\times5}=\frac{24}{35}$ (c)

6. $1\text{ m} = 100\text{ cm}$

   $\frac{1000}{25}=\frac{40}{1}$ or $40:1$ (a)

6 Unitary Method

Exercise 6

1. Expenditure of

10 children $= ₹ 9500$

1 child $= ₹ 950$

15 children $= 950 \times 15$

$= ₹ 14250$

2. (a) Worker earn in 15 months $= ₹ 18000$

1 month $= \frac{18000}{15}$

7 months $= \frac{18000}{15} \times 7$

$= ₹ 8400$

(b) ₹ 18000 earn in $= 15$ months

₹ 1 earn $= \frac{15}{18000}$

₹ 30,000 earn $= \frac{15}{18000} \times 30000$

$= 25$ months

3. 36 m cost $= ₹ 540$

1 m cost $= \frac{540}{36}$

15 m cost $= \frac{540}{36} \times 15$

$= ₹ 225$

4. Total weight $= 40 \times 25$

$= 1000$ kg

1000 kg weight cost $= ₹ 2750$

1 kg weight cost $= \frac{2750}{1000}$

As total weight $= 35 \times 50 = 1750$ kg

1750 kg weight cost $= \frac{2750}{1000} \times 1750$

$= 4812.5$

5. Car travels

600 km $= 8$ hours

1 km $= \frac{8}{600}$

850 km $= \frac{8}{600} \times 850 = \frac{68}{60}$

$11\frac{1}{3}$ hours or 11 hours 20 minutes.

6. Total weight $= 15 \times 40$

$= 600$ kg

600 kg weight cost $= ₹ 3000$

1 kg weight cost $= \frac{3000}{600}$

Total weight $= 35 \times 50$

$= 1750$ kg

1750 kg weight cost $= 5 \times 1750$

$= ₹ 8750$

7. $(A+B)$ work in 1 day $= \frac{1}{5}$

$(A+C)$ work in 1 day $= \frac{1}{4}$

$(B+C)$ work in 1 day $= \frac{1}{3}$

$2(A+B+C)$ work in 1 day $= \frac{1}{5}+\frac{1}{4}+\frac{1}{3}=\frac{12+15+20}{60}$

$\frac{47}{60}$

$(A+B+C)$ work in 1 day $= \frac{47}{60}\times\frac{1}{2}=\frac{47}{120}$

$[(A+B+C)-(B+C)]$ work in 1 day $= \frac{47}{120}-\frac{1}{3}$

$(A+B+C-B-C)$ work in 1 day $= \frac{47-40}{120}=\frac{7}{120}$

So, A work in 1 day $= \frac{7}{120}$

A will complete the work in $\frac{120}{7}$ days or $17\frac{1}{7}$ days.

8. Given; 8 cows = 6 oxen

So, 4 cows = 30 oxen

6 oxen can eat the grass field in = 12 days

1 oxen can eat the grass field in = 12×6 days

4 cows + 9 oxen = 3 oxen + 9 oxen = 12 oxen

12 oxen can eat the grass field in $= \frac{12\times 6}{12}=6$ days

9. Food 45 students eat = 50 days

1 student = 50×450

500 students $= \frac{50 \times 450}{500} = 45$

$= 45$ days

10. (A+B+C) work in 1 day $= \frac{1}{15}$

B work in 1 day $= \frac{1}{30}$

C work in 1 day $= \frac{1}{40}$

(A+B+C) – (B+C) work in 1 day $= \frac{1}{15} - \left(\frac{1}{30} + \frac{1}{40}\right)$

or A work in 1 day $= \frac{8 - (4+3)}{120}$

$= \frac{1}{120}$

So, A will complete the work in 120 days.

11. 20 men will complete the remaining work in = 10–3 = 7 days

1 men will complete the remaining work in = (20×7) days

20–5 = 15 men will complete the remaining work in

$= \frac{20 \times 7}{15} = \frac{28}{3}$

$= 9\frac{1}{3}$ days

12.

x	4	p	6
y	10	20	q

As per statement x and y are in direct proportion.

So, $\frac{4}{10} = \frac{p}{20}$

$$4 \times 20 = p \times 10$$

$$p = \frac{4 \times 20}{10} = 8$$

Also, $\frac{8}{20} \quad \frac{6}{q}$

$$8 \times q = 6 \times 20$$

$$q = \frac{6 \times 20}{8} = 15$$

So, p = 8 and q = 15 **Ans.**

Check Your Mental Maths IQ

1. One unit, single quantity
2. Direct variation
3. Inverse variation
4. Inverse variation
5. Direct variation
6. Solution :

2 pens cost = ₹ 720

1 pen cost = $\frac{720}{12}$

6 pen cost = $\frac{720}{12} \times 6$

₹ 360 Ans.

7. Solution :

8 men dig well = 18 days

1 man dig well = 18 × 8

12 men dig well = $\frac{18 \times 8}{12}$

= 12 days

Multiple Choice Questions (MCQ)

1. (a) Cost of 4 kg apples $= ₹\,200$

Cost of 1 kg apple $= \frac{200}{4}$

cost of 12 kg apples $= \frac{200}{4} \times 12 = ₹600$

2. (b) A car goes

300 km in $= 25\,\ell$

or in 25 litres $= 300$ km

in 1 litre $= \frac{300}{25}$ km

in 80 litres $= \frac{300}{25} \times 80$

$= 960$ km

3. (b)

9 kg $= 72$ books

1 kg $= \frac{72}{9}$

6 kg $= 8 \times 6 = 48$ books

4. (b) Work finish by

8 men $= 15$ days

1 man $= 15 \times 8 = 120$

10 men $= \frac{120}{10}$

$= 12$ days

5. (b) Family wheat consumption

4 members $= 52$ kg

1 member $= \frac{52}{4}$

6 members $= 13 \times 6$

$= 78$ kg

6. (c) Total pens $= 5 \times 20$

$= 100$ pens

100 pen cost $= ₹ 800$

1 pen cost $= ₹ 8$

Total pen $= 40 \times 18 = 720$

720 pens cost $= 8 \times 720$

$= ₹ 5760$

7 Percentage

Exercise 7A

1. (a) $12\frac{1}{2}\%$ of 64

$$\frac{25\times 64}{2\times 100}=8$$

(b) 75% of 400

$$\frac{75}{100}\times 400=300$$

(c) $\frac{6}{10000}\times\frac{110}{1}$

$=0.066$

(d) $\frac{5}{100}\times 1400=70$

2. (a) $\frac{15}{100}\times 120$

$=₹18$

(b) $\frac{25}{100}\times 100$

$=25$ students

(c) $\frac{10}{100}\times 195$

$=₹19.50$

(d) $\frac{20}{100}\times 80$

$=16$ men

3. (a) ₹4 of ₹40

$$\frac{4}{40} \times 100 = 10\%$$

(b) 12 minutes of 1 hour or 60 minutes

$$\frac{12}{60} \times 100 = 20\%$$

(c) 5 students of 25 students

$$\frac{5}{15} \times 100 = 20\%$$

(d) 3 months of 12 months

$$\frac{3}{12} \times 100 = 25\%$$

4. (a) What percent of 40 is 8?

$$\frac{8}{40} \times 100 = 20\%$$

(b) ₹500 is ₹600

$$\frac{600}{500} \times 100 = 120\%$$

(c) 80 m is 24?

$$\frac{24}{80} \times 100 = 30\%$$

(d) 45 kg is 90 kg

$$\frac{90}{45} \times 100 = 200\%$$

(e) 250 ℓ is 125 ℓ?

$$\frac{125}{250} \times 100 = 25\%$$

(f) 30 km is 7.5 km

$$\frac{7.5}{30}\times 100 = 25\%$$

5. The number $= \frac{54}{30}\times 100 = 180$

6. (a) $\frac{2}{3}\times 100 = \frac{200}{3} = 66\frac{2}{3}\%$

$$\begin{array}{r|l} 3 & 200 \\ & 18 \\ \hline & 20 \\ & 18 \\ \hline & 2 \end{array}\quad 66$$

(b) $\frac{11}{6}\times 100 = \frac{550}{3} = 183\frac{1}{3}\%$

(c) $\frac{17}{15}\times 100 = \frac{340}{3} = 113\frac{1}{3}\%$

7. (a) $\frac{5}{7}\times\frac{100}{1} = \frac{500}{7} = 71\frac{3}{7}\%$

(b) $\frac{9}{2}\times\frac{100}{1} = \frac{900}{2} = 450\%$

(c) $\frac{11}{6}\times 100 = \frac{550}{3} = 183\frac{1}{3}\%$

8. $\frac{42}{48}\times 100 = \frac{175}{2} = 87\frac{1}{2}\%$

9. (a) $\frac{24}{100}\times 100 = 24\%$

(b) $\frac{275}{1000}\times\frac{100}{1} = 27.5\%$

10. $\frac{84}{70}\times 100 = 120\%$

11. (a) $\frac{136}{100} = 1\frac{9}{25}$

(b) $\frac{400}{100} = 4$

Exercise 7B

1. $\frac{120}{250} \times 100$

   $= 48\%$ students is passed.

2. $\frac{60}{100} \times 2500 = 1500$ boys

   $= 2500 - 1500 = 1000$ girls

3. $\frac{16200}{18000} \times 100 = 90\%$

4. Airline ticket costs = ₹ 12800

   Tax = $12800 \times \frac{5}{100} =$ ₹ 640

   Total costs = $12800 + 640 =$ ₹ 13440

5. Increase in population = $56000 - 48000 = 8000$

   Original population = 48000

   Increase = 8000

   Percentage of increase = $\frac{8000}{48000} \times 100 = \frac{50}{3} or 16\frac{2}{3}\%$

   $= 16\frac{2}{3}\%$

6. Hindi = $\frac{60}{75} \times 100 = 80\%$

   English = $\frac{80}{100} \times 100 = 80\%$

   Maths = $\frac{35}{40} \times 100 = \frac{175}{2} = 87\frac{1}{2} = 87.5\%$

i.e. Anju scored best in Maths.

7. decrease in price = ₹ 9000 – ₹ 1500 = ₹ 1500

   $\%\ \text{decrease} = \frac{1500}{9000} \times 100 = \frac{50}{3} = 16\frac{2}{3}\%$

8. $\frac{20}{100} \times 2400 = 480$ gm ghee

   $\frac{30}{100} \times 2400 = 720$ gm sugar

   $\frac{50}{100} \times 2400 = 1200$ gm besan

   So, we used 480 gm ghee, 720 gm sugar and 1200 gm besan

9. Increase in salary = ₹15000 – ₹12000 = ₹ 3000

   So, % increase $= \frac{3000}{12000} \times 100 = 25\%$

10. First increase $= \frac{20}{100} \times 10 = 2$

    Price after first increase i.e. = 10 + 2 = ₹12

    and then increase $= \frac{25}{100} \times \frac{12}{1} =$ ₹ 3

    i.e. ₹12 + ₹ 3 + = ₹15

    So, the new cost of sugar = ₹15

Check Your Mental Maths IQ

1. 100
2. ₹ 50 of ₹ 60

   $\frac{50}{60} \times \frac{100}{1} = \frac{250}{3} = 83\frac{1}{3}\%$

3. $\frac{24}{60} \times 100 = 40\%$

4. $\frac{15}{100} \times 120 = 18$ egg

$120 - 18 = 102$ egg left

5. $\frac{5}{4} \times 100 = 125$

$\frac{4}{5} \times 100 = 80$

6. Decrease $8 - 640 = 1.6$

$\frac{1.6}{8} \times 100 = 20\%$

Multiple Choice Questions (MCQ)

1. $\frac{8}{160} \times 100 = 5\%$ (b)

2. $\frac{75}{100} \times 400 =$ ₹300 (b)

3. $\frac{36}{60} \times 100 = 60\%$ (a)

4. $\frac{30}{75} \times 100 = \frac{3000}{45} = 40$ (a)

5. $\frac{5}{100} \times x = 8$

$x = \frac{800}{5} = 160$ (b)

6. $\frac{15}{100} \times 30 = 4.5$ (b)

7. $\frac{25}{40} \times 440 = 110$

$440 - 110 = 330$ (c)

8. $\frac{36}{30} \times 100 = 120\%$

Rest $120 - 100 = 20\%$ (b)

9. $\frac{15}{100} \times 40 = 6$

Original cost $-$ reduced cost $=$ rest

$= 40 - 6 = 34$ (a)

10. $\frac{3}{5} \times 100 = 60$

$\frac{2}{5} \times 100 = 40$

(b) 60, 40

8 Profit and Loss

Exercise 8

1. C.P. = ₹7500; S.P. = ₹6600

$$\text{Loss} = ₹7500 - ₹6600 = ₹900$$

$$\text{Loss\%} = \frac{Loss \times 100}{C.P.}$$

$$= \frac{900 \times 100}{7500}$$

$$= 12\%$$

2. (a) C.P. = ₹500; S.P. = ₹600

as S.P. > C.P. then profit

P = 600 – 500 = 100

(b) P = S.P. – C.P.

₹120.50 = 2390 – C.P.

C.P. = ₹2269.5

3. Let S.P. of 10 eggs = x

$$1 \text{ egg} = \frac{x}{10}$$

C.P. of 12 eggs is x g

C.P. of 1 egg is $= \frac{x}{12}$

$$\text{Profit} = \frac{x}{10} - \frac{x}{12}$$

$$= \frac{x(6-5)}{60}$$

$$= \frac{x}{60}$$

$$\text{Profit}\% = \frac{\frac{x}{60}\times 100}{\frac{x}{12}} = \frac{100x\times 12}{60\times x}$$

$$= 20\%$$

4. Total C.P. = ₹1215 + ₹35 = ₹1250

$$16\% = \frac{P\times 100}{C.P.}$$

$$\frac{16\times 1250}{100} = P$$

$$p = 200$$

$$S.P. - C.P. = P$$

$$S.P. = P + C.P.$$

$$= ₹200 + ₹1250$$

$$= ₹1450$$

5. S.P. of B = ₹1500

P% = 20%

C.P. = ?

As we know $= C.P. = \frac{S.P.\times 100}{(100+P)}$

For B, C.P. $= \frac{1500\times 100}{(100+25)}$

$$= \frac{150000}{125} = 1200$$

For B. C.P. = ₹1200

for A it is S.P. = ₹ 1200

P% = 20%

C.P. $= \frac{1200\times 100}{(100+20)}$

$$\frac{120000}{120} = 1000$$

C.P. $= ₹1000$

So, A pay ₹1000 for it.

6. Let the man buys 180 oranges of first kind and same number of second kind.

So, cost price of first kind $= \frac{5}{4} \times \frac{180}{1} = ₹225$

So, cost price of second kind $= \frac{6}{5} \times \frac{180}{1} = ₹216$

So, total Cp for $(180 + 180)$ $= 360$ oranges

$= ₹(225 + 216) = ₹441$

S.P. for 360 oranges $= \frac{11}{9} \times \frac{360}{1} = ₹440$

So, loss $= ₹(441 - 440) = ₹1$

Loss % $= \frac{1}{441} \times 100 = \frac{100}{441}\%$

7. For Anil ; C.P. $= ₹200$; P $= 20\%$

$$S.P. = \frac{C.P. \times (100 + P)}{100}$$

S.P. $= \frac{(100 + 20)}{100} \times \frac{C.P.}{1}$

S.P. $= \frac{120}{100} \times 200$

S.P. $= ₹240$

S.P of Anil is C.P. to Ajay $= ₹240$

For Ajay

$$\text{S.P.} = \frac{(100 - L\%)}{100} \times C.P.$$

$$= \frac{(100-10)}{100} \times 240 = \frac{90}{10} \times 24$$

$$= 9 \times 24$$

$$= ₹216$$

So, Atul pay ₹216 for this book.

8. 160 dozen ornages for ₹4800

Sell ₹35 per dozen.

$$\text{C.P.} = ₹4800$$

$$\text{S.P.} = 160 \times 35$$

$$= ₹5600$$

$$\text{P} = 800$$

$$\text{P\%} = \frac{800}{4800} \times 100$$

$$= 16\frac{2}{3}\%$$

9. Let the shopkeepr buys greeting cards of first kind 300 and second kind 300.

$$\text{So, C.P. of first kind} = \frac{20}{25} \times \frac{300}{1} = ₹240$$

$$\text{So, C.P. of second kind} = \frac{20}{15} \times \frac{300}{1} = ₹400$$

So, total cost price for $(300 + 300) = 600$ greeting cards

$$= 240 + 400 = ₹640$$

$$\text{S.P. for 600 greeting cards} = \frac{20}{20} \times \frac{600}{1} = ₹600$$

$$\text{So, loss} = ₹640 - 600 = ₹40$$

Loss % $= \frac{140}{640} \times \frac{100}{1} = \frac{25}{4} = 6\frac{1}{4}\%$

10. Let the shopkeeper buys 100 pencils and 100 pens

Cost price of pencils $= ₹1.50 \times 100 = ₹150$

Cost price of pens $= ₹2.25 \times 100 = ₹225$

Total cost price of both $= ₹(150 + 225) = ₹375$

S.P. $(100 + 100) = 200$ pens & pencils $= 200 \times 2 = ₹400$

So, Profit $= ₹(400 - 375) = ₹25$

$$\text{Profit \%} = \frac{25}{375} \times \frac{100}{1} = \frac{20}{3} or 6\frac{2}{3}\%$$

Check Your Mental Math IQ

1. Cost price
2. Selling price
3. Loss
4. Profit
5. Cost prise
6. Solution :

S.P. $= ₹990$

P% $= 10\%$

$$\text{C.P.} = \frac{S.P. \times 100}{(100 + P\%)}$$

$$= \frac{990 \times 100}{110}$$

$= ₹900$

7. Let C.P. of 1 egg be ₹1

Then C.P. of 12 eggs $= ₹12$

S.P. of 10 eggs $= ₹12$

S.P. of 1 egg $= \frac{12}{10} = ₹1.20$

Gain $= ₹1.20 - ₹1.00 = ₹0.20$

Gain % $= \frac{P \times 100}{C.P.} = 0.20 \times 100 = 20\%$

Multiple Choice Questions (M.C.Q.)

1. (b) C.P. = 500 Gain = 5%

$$\text{S.P.} = \frac{(100 \times G\%)}{100} \times \frac{C.P.}{1}$$
$$= \frac{105}{100} \times 500$$
$$= ₹525$$

2. (c)

S.P. of TV = ₹9000

P% = 20%

$$\text{C.P.} = \frac{S.P. \times 100}{(100 + G\%)}$$
$$= \frac{9000 \times 100}{120}$$
$$= ₹7500$$

3. (a) 12 for ₹10

C.P. 12 for ₹ 10

1 for ₹ $\frac{10}{12}$ or $\frac{5}{6}$

S.P. 4 for ₹ 5

1 for ₹ $\frac{5}{4}$

as S.P. > C.P.

$$\text{So, Gain} = ₹\left(\frac{5}{4} - \frac{5}{6}\right)$$
$$= \frac{5(3-2)}{12}$$

$$= ₹\frac{5}{12}$$

$$P\% = \frac{\frac{5}{12}\times 100}{5/6} = \frac{5}{12}\times\frac{100\times 6}{5}$$

$$= \frac{500\times 6}{12\times 5}$$

$$= 50\% \text{ gain (a)}$$

4. (a) Let C.P. of 1 article be ₹ 1

Then C.P. of 6 articles = ₹ 6

S.P. of 6 articles = ₹6

S.P. of 1 article $= \frac{6}{5} = 1.20$

Gain $= 1.2 - 1.00 = ₹0.20$

G% $= \frac{P\times 100}{C.P.} = \frac{0.20}{1}\times 100$

$= 20\%$ (a)

(b) L% = 20% S.P. = ₹280

$$\text{C.P.} = \frac{SP\times 100}{(100 - L\%)}$$

$$= \frac{1280\times 100}{(100-20)}$$

$$= \frac{128000}{80}$$

$$= ₹1600 \text{ (b)}$$

9 Simple Interest

Exercise 9

1. P = 800; R = 18%

$$\text{S.I.} = \frac{P \times R \times T}{100}$$

$$= \frac{800 \times 18 \times 1}{100}$$

$$= ₹144$$

2. P = ₹15000; R = 5%; T = 3 years

$$\text{S.I.} = \frac{P \times R \times T}{100}$$

$$= \frac{15000 \times 5 \times 3}{100}$$

$$\text{S.I.} = ₹2250$$

$$\text{A} = ₹(15000 + 2250)$$

$$= ₹17250$$

3. A = 900

$$\text{A} = (\text{S.I.} + \text{P})$$

$$\text{S.I.} = \frac{P \times 6 \times 10}{100}$$

$$= 0.6\,\text{P}$$

$$\text{A} = 0.6\,\text{A} + 1\text{P}$$

$$900 = 1.6\text{P}$$

$$\frac{900}{16} = \text{P}$$

P $= ₹562.5$

4. A $= ₹4130$

A $= (S.I. + P)$

S.I. $= \frac{P \times R \times T}{100}$

$= \frac{3500 \times R \times 2}{100}$

$= 70R$

$4130 = 70R + 3500$

$\frac{630}{70} = R$

$R = 9\%$

5. $P = 25000$; $T = 4$; $R = 9\%$

S.I. $= \frac{25000 \times 4 \times 9}{100} = ₹9000$

$= ₹9000$

A $= (S.I. + P)$

$= ₹(9000 + 25000)$

$= ₹34000$

6. $P = 640$; $A = 768$

S.I. $= (A - P)$

$= (768 - 640$

$= ₹128$

T $= \frac{5}{2}$

S.I. $= \frac{P \times R \times T}{100}$

$128 = \frac{640 \times R \times 5/2}{100}$

$$\frac{2\times12800}{5\times640} = R$$

$R = 8\%$

Then $R = 8\%$; $A = 868$; $T = 3$ years

$$S.I. = \frac{P\times8\times3}{100}$$

$$= 0.24P$$

$A = P + S.I.$

$868 = P + 0.24P$

$868 = 1.24\,P$

$$\frac{868}{1.24} = P$$

$P = ₹700$

7. $T = 4$ years; $R = 10\%$;

$$S.I._1 = \frac{P\times4\times10}{100} = 0.4P$$

$T = 3$ years

$R = 15\%$

$$S.I._2 = \frac{P\times3\times15}{100} = 0.45P$$

According to question

$S.I._1 + 105 = S.I._2$

$0.4P + 105 = 0.45P$

$105 = (0.45 - 0.4)P$

$105 = 0.05P$

$$\frac{10500}{5} = P$$

$P = ₹2100$

8. Principal + 6 years simple interest = ₹ 5112

Principal + 9/2 years simple interest = ₹4734

$\frac{3}{2}$ years simple interest = ₹ 378

1 year simple interest $= \frac{378 \times 2}{3} = 252$

6 years simple interest $= 252 \times 6 =$ ₹1512

Amount = ₹ 5112

S.I. = ₹ 1512

Principal = ₹3600

S.I. = ₹1512

Time = 6 years

Rate $= \frac{S.I. \times 100}{P \times T} = \frac{1512 \times 100}{3600 \times 6}$

$= 7\%$

So, Principal = ₹3600

9. P = 25000; T = 5 years;

Let first rate be = R

S.I. $= \frac{P. \times R \times T}{100}$

$= \frac{25000. \times R \times 5}{100}$

$= 1250\,R$

Second, P = ₹ 35000; T = 3 years'; Rate = (R + 3)%

S.I. $= \frac{35000. \times (R+3) \times 3}{100}$

$= (1050)\,(R+3)$

$S.I._1 + S.I._2 = 1250R + 1050R + 3150$

$21550 - 3150 = 2300R$

$$\frac{18400}{2300} = R$$

$R = 8$

So, first rate $R = 8\%$

And second rate $= 8 + 3 = 11\%$

So, two rates are 8% and 11%

10. Let the principal be $= ₹100$

Amount $= 2 \times 100 = ₹200$

So, Simple interest $= ₹200 - ₹100 = ₹100$

$$\text{Time} = 12\frac{1}{2} \text{ years} = \frac{25}{2} \text{ years}$$

$$\text{Rate} = \frac{S.I. \times 100}{P \times T} = \frac{100 \times 100}{100 \times \frac{25}{2}}$$

$$= \frac{100 \times 100 \times 2}{100 \times 25} = 8\%$$

Now principal $= ₹100$

Amount $= 3 \times 100 = ₹300$

Simple Interest $= ₹(300 - 100) = ₹200$

Rate $= 8\%$

$$\text{Time} = \frac{S.I. \times 100}{P \times R} = \frac{200 \times 100}{100 \times 8}$$

$= 25$ years

Check Your Mental Math IQ

1. Principal
2. Interest
3. Amount
4. $\frac{P. \times R \times T}{100}$

5. S.I.

6. $240 = \frac{600 \times 8 \times T}{100}$

$\frac{240}{48} = T$

T = 5 years

7. $3P = \frac{P \times 8 \times R}{100}$

$\frac{300}{8} = R$

$R = 37\frac{1}{2}\%$

8. S.I. = $\frac{1200 \times 2 \times 6}{100}$

= ₹ 144;

So, amount = P + S.I.

= ₹ 1200 + ₹144

= ₹ 1344

Multiple Choice Questions (M.C.Q.)

1. (a) S.I. = Amount – Principal = ₹360 – ₹300 = ₹60

$60 = \frac{300 \times 4 \times T}{100}$

60 = 12T

5 = T

Time = 5 years (a)

2. (b) Simple interest = $\frac{600 \times 12 \times 1}{100}$

= ₹ 72 (b)

3. (a) S.I. = 110; P = 1250

$$A = S.I. + P$$
$$= 110 + 1250$$
$$= ₹1360 \text{ (a)}$$

4. (d) Amount = ₹2904; Principal = ₹2400

Simple interest = ₹(2904 – 2400) = ₹504

Time = 3 years

$$R = \frac{S.I. \times 100}{P \times T} = \frac{504 \times 100}{2400 \times 3}$$
$$= 7\%$$

5. (b) Amount = ₹5500; Principal = ₹5000; Rate = 5%

$$S.I. = (A - P) = ₹(5500 - 5000) = ₹500$$

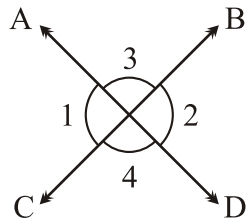
$$\text{Time} = \frac{S.I. \times 100}{P \times R} = \frac{500 \times 100}{5000 \times 5}$$
$$= 2 \text{ years}$$

6. (c) $$\text{Principal} = \frac{S.I. \times 100}{R \times T} = \frac{1020 \times 100}{4 \times 3}$$
$$= ₹8500$$

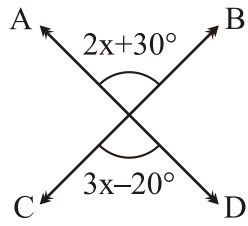
10 GEOMETRY
Understanding Shapes

Exercise 10A

1. (a) $90° = 90° - 90° = 0°$
   (b) $81° = 90° - 81° = 9°$
   (c) $0° = 90° - 0° = 90°$
   (d) $9° = 90° - 9° = 81°$
   (e) $27° = 90° - 27° = 63°$
2. (a) $99° = 180° - 99° = 81°$
   (b) $170° = 180° - 170° = 10°$
   (c) $111° = 180° - 111° = 69°$
   (d) $63° = 180° - 63° = 117°$
   (e) $95° = 180° - 95° = 85°$
3. Complementary = (c), (h)
   Supplementary = (d), (e), (g)
   Neither complementary nor supplementary = (a), (b), (f)
4. $\angle 1 = 50°$
   $\angle 3 = 180° - \angle 1$
   $= 180° - 50° = 130°$
   $\angle 2 = 180° - \angle 3$
   $= 180° - 130° = 50°$
   $\angle 4 = 180° - 50° = 130°$



5. (a) $2x + 30° = 3x - 20°$
   (vertically opposite angles)
   $50° = x$

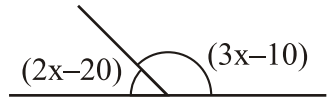


(b) $3x-10+2x-20°=180°$ (linear pair)

$=5x-30°=180°$

$5x=30°+180°=210°$

$x=\frac{240}{5}=42°$



6. Ratio of two angles of the linear pair = 2 : 1

Let ratio be 2x : 1x

$2x+x=180$ (Linear pair)

$3x=180°$

$x=60°$

So, the angles are $=2\times 60°=120°; x=60°$

7. The angles are complementary and equal.

Then $x+x=90°$

$2x=90°$

$x=45°$

8. Let the equal angles be 'x'.

$x+x=180°$ (supplementary)

$2x=180°$

$x=90°$ Ans.

9. ∠DOC, ∠COB; ∠COB; ∠BOA; ∠DOB; ∠BOA; ∠DOC; ∠COA

10. (a) No, (b) No (c) No

11. (a) $\angle ABD+\angle CBD=90°$ (given)

So, $2x-15°+x-15°=90°$

$3x-30°=90°$

$3x=120°$

$x=40°$

So, $\angle CBD=x-15°=40°-15°=25°$

(b) Supplementary of ∠ABD

as $\angle ABD = (2x - 15°)$

$(2 \times 40 - 15°) = 80 - 15°$

$= 65°$

And supplementary $= 180 - 65 = 115°$

12. (a) False (b) False (c) True

(d) True (e) True (f) True

Exercise 10B

1. (a) P$\angle$X, LMR; XLQ,LMS,PLM,RMY;QLM,SMY

(b) LMR,QLM; $\angle$MS<PLM

(c) PLX, RMY; XLQ,SMY

(d) PLM,LMR; QLM,LMS

2. $\angle 1 = 65°$ (Given)

$\angle 1 = 2$ (Vertically opposite angles)

i.e. $\angle 2 = 65°$

$\angle 2 = \angle 3$ (Corresponding angles)

$\angle 3 = 65°$

$\angle 1 = \angle 8$ (Corresponding angles)

$\angle 8 = 65°$

$\angle 1 + \angle 5 = 180°$ (linear pair are supplementary)

$\angle 5 = 180° - 65° = 115°$

$\angle 5 = 115°$

$\angle 5 = \angle 7$ (Corresponding angles)

$\angle 7 = 115°$

$\angle 5 = \angle 6$ (Vertically opposite angles)

$\angle 6 = 115°$

$\angle 6 = \angle 4$ (Corresponding angles)

$\angle 4 = 115°$

3. $\angle EFA = \angle y = \angle x$ (Alternate interior angles)

$\angle 50° = \angle y = \angle x$

4. In ΔABC

$\angle A + \angle B + \angle C = 180°$ (sum of all the angles of a triangle)

$\angle y + 60° + 90° = 180°$

$\angle y = 30°$

$\angle QAC = \angle ACB$ (Alternate interior angles)

i.e. $\angle z = 90°$

$\angle x + \angle y = 90°$ (Complementary)

$\angle x = 90° - 30°$

$\angle x = 60°$

5. (a) Yes (b) Yes (c) Yes

6. (a) $\angle 1, \angle 4; \angle 2, \angle 3$

(b) $\angle 1, \angle 7; \angle 3, \angle 5; \angle 2, \angle 8; \angle 4, \angle 6$

(c) $\angle 1, \angle 3; \angle 2, \angle 4$ (d) $\angle 2$

(e) $\angle 6$ (f) $\angle 7, \angle 5; \angle 8, \angle 6$

(g) $\angle 1, \angle 3; \angle 2, \angle 4$

7. (a) $\angle a = 110°$ (vertically opposite angles)

$\angle b + \angle 110° = 180°$ (supplemenatry)

$\angle b = 70°$

(b) $\angle b = 130°$ (vertically oppsite)

$\angle a + \angle b = 180°$ (Supplementary)

$\angle a = 180° - 130°$

$= 50°$

(c) $\angle b = 105°$ (corresponding angles)

$\angle a + \angle 105° = 180°$ (supplementary)

$\angle a = 75°$

(d) $\angle a = 70°$ (Alternate interior angle)

$\angle a + \angle b = 180°$ (Supplementary)

$\angle b = 180° - 170°$

$\angle b = 110°$

8. (a) Yes AB $\parallel$ CD (b) PQ $\parallel$ RS Yes

(c) $\angle a = 70°$ (vertically opposite angles)

$\angle b = 70°$ (vertically oposite angle)

$\angle c = 110°$ (vertically opposite angle)

$\angle d = 70°$ (corresponding angle)

9. (a) $\angle x = \angle PQR$ (Alternate interior angle)

i.e. $x = 28°$

(b) $x + 3x = 180°$ (Supplementary)

$4x = 180°$

$x = 45°$

(d) $\angle AOC = 50°$ (Alternate interior)

So $\angle x + 50 + 48 = 180°$ (supplementary)

$\angle x = 180 - 98$

$\angle x = 82°$

10. $\angle A = C$ (opposite angle of)

$\angle C = 40°$

$\angle D + \angle A = 180°$ (sum of adjacent angles)

$\angle D = 180 - 40$

$\angle D = 140°$

$\angle D = \angle B$ (opposite angles of)

$\angle B = 140°$

11. (a) True (b) True (c) True
(d) False (e) True

Check Your Mental Math IQ

1. No 2. Obtuse 3. 90°
4. acute 5. In the north direction
6. 135° 7. 144° 8. Supplementary
9. Solution :

$$180° = 135° + x \text{ (Supplementary)}$$
$$45° = x$$

as $x = y$ (corresponding)
$y = 45°$
and $z = 135°$

10. $m = 45°$ (corresponding angles)
$180° - 45° = p$ (supplementary)
$= 135°$
$n = m$ (alternate interior angles)
$n = 45°$
$O = 45°$ (alternate interior angles)

Multiple Choice Questions (M.C.Q.)

1. (b) 180°
2. (c) $90 - 36 = 54°$ (sum of complementary angles is = 90°)
3. (b) $180 - 75 = 105°$ (sum of supplementary angles is 180°)
4. (a) 180° 5. b) supplementary
6. Let ratio be x

$$2x + 7x = 180°$$
$$9x = 180°$$
$$x = 20°$$

So, angles are 40°, 140° (b)

7. (a) 70° (Alternate interior angles)

11 Properties of Triangles

Exercise 11a

1. $180 = x + 80$ (supplementary)

   $100 = x$

   As $80 + y = 120°$ (exterior angle property)

   $y = 120° - 80°$

   $= 40°$

2. Let the 3rd angle is x

   $65° + 85° + x = 180°$ (sum of angles in Δ)

   $x = 180° - 150°$

   $x = 30°$

3. Let the ratio be x

   $1x+2x+6x = 180°$

   $9x = 180°$

   $x = 20°$

   So, angles are 20°, 40°, 120°. Obtuse angle triangle

4. Let the equal angle be x

   $x+30°+x = 180°$

   $2x = 150°$

   $x = 75°$

   angles are 75°, 75°

5. The sum of angle of Δ's are 180°

   (a) $45 + 60 + 72$

   $= 177$

   No

   (b) $48 + 60 + 72$

   $= 180°$ Yes

(c) $65 + 55 + 50$

$= 170°$

No

(d) $90 + 80 + 10$

$= 180°$

Yes

(e) $80 + 80 + 30$

$= 190°$

No

6. $40° + 30° + r = 180°$ (angle sum)

$r = 180° - 70°$

$r = 110°$

$\angle P = 30°$ (corresponding angles)

$\angle q = \angle r = 110°$ (corresponding angles)

7. Let the another opposite angle be x and the adjacent be y.

So, $x + 55 = 95°$

(exterior angle property)

$x = 40$

So, $\angle x + \angle y + 55 = 180°$ (Angle sum)

$y = 180° - 95°$

$y = 85°$

8. Let the ratio be x.

So, $5x + 3x = 80°$ (exterior angles)

$8x = 80°$

$x = 10°$

and $180° - 80° = 100°$ (supplementary)

So, angles are 50°, 30° and 100°.

9. Let 3rd angle is

$$90° + 60° + y = 180°$$
$$y = 180 - 150$$
$$y = 30°$$

10. $$2x + 3x + 4x = 180°$$
$$9x = 180°$$
$$x = 20°$$

$20°, 60°, 80°$.

11. Let the one angle be x, then other be 2x

So, $$x + 2 + 90° = 180°$$
$$3x = 90°$$
$$x = 30°$$

So, angles are $30°, 60°, 90°$.

12. (a) $$38 + x° = 70° \text{ (exterior angle)}$$
$$x = 32°$$

(b) Let $\angle PQR = y$; $\angle QPR = z$

$$110 + z = 180° \text{ (supplementary)}$$
$$z = 70°$$
$$125° = z + x$$
$$125 - 70 = x \text{ (exterior angle)}$$
$$x = 55°$$

(c) $$105 = x + 60° \text{ (exterior angles)}$$
$$105 - 60 = x$$
$$x = 45°$$

(d) Let $\angle LNM = y$; $\angle NML = z$

$$122° + y = 180° \text{ (linear pair angles)}$$
$$y = 58°$$
$$130° = y + x$$
$$130° - 58° = x$$
$$72° = x$$

13. Let the ratio be x

So, $2x+x+90° = 180°$

$3x = 90°$

$x = 30°$

So, angles are 60°, 30°.

Exercise 11B

1. (a) 6, 5, 10

$6+5=11>10$

Yes

(b) 3, 5, 9

$3+5=9$

No

(c) 6, 7, 8

$6+7=13>8$

Yes

(d) 3, 7, 12

$7+3=10<12$

No

2. (a) issoceles (b) equilateral

(c) scalene (d) isosceles

(e) scalene (f) isosceles

3. (a) < (b) <

(c) >

4. Given $\angle DFE = \angle z = 50°$

$180 = 50 + y$; So, $y = 130°$

$\angle x = \angle z + 50°$ (exterior angle)

$\angle x = \angle 50° + \angle 50° = 100°$

5. Given BM = MC (AM is a median)

In ΔABM

$AB + BM > AM$ .....(i) (triangle inequality property)

Also in ΔAMC

$AC + CM > AM$ .....(ii)

Adding (i) and (ii), we have

$AB + AC + BM + CM > 2AM$

$AB + AC + BC > 2AM$

6. H = 15cm; b = 12 cm

$$H^2 = P^2 + B^2$$
$$(15)^2 = (P)^2 + (12)^2$$
$$225 - 144 = (P)^2$$
$$81 = (P)^2$$
$$9 = P$$

So, perpendicular = 9 cm

7. For right angle Δ^{-3}

(a) $(10)^2 = (6)^2 + (8)^2$

$100 = 36 + 64$

$100 = 100$ Yes

(b) $(9)^2 = (5)^2 + (8)^2$

$81 = 25 + 64$

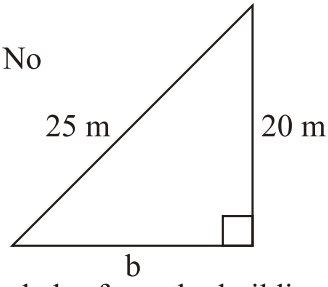
$81 \neq 89$ No

8. $(25)^2 = (20)^2 + (b)^2$

$625 = 400 + b^2$

$225 = b^2$

$15 = b$



i.e. the distance of the foot of the lader from the building b = 15 cm

9. (a) $(10)^2 = (6)^2 + (8)^2$

$100 = 36 + 64$

$100 = 100$

Yes, it is a pythagorean triplet

(b) $(9)^2 = (7)^2 + (3)^2$

$81 = 49 + 9$

$81 \neq 58$

No, it is not pythagorean triplets

(c) 27, 36, 45

$(45)^2 = (36)^2 + (27)^2$

$2025 \quad 1296 + 729$

$2025 = 2025$

Yes, it is a phythagorean triplet

10. $(H)^2 = (10)^2 + (24)^2$

$(H)^2 = 100 + 576$

$(H)^2 = 676$

$H = 26$

$= 26\,m$

11. $(AD)^2 + (DC)^2 = (AC)^2$

$(AD)^2 = (13)^2 - (5)^2$

$(AD)^2 = 169 - 25$

$(AD)^2 = 144$

$AD = 12\,cm$

$(AD)^2 + (BD)^2 = (AB)^2$

$(12)^2 + (BD)^2 = (15)^2$

$(BD)^2 = 225 - 144$

$(BD)^2 = 81$

$BD = 9\,cm$

12. $(H)^2 = (6)^2 + (8)^2$

$(H)^2 = 36 + 64$

$(H)^2 = 100$

$H = 10\,km$

13. $(PR)^2 = (PQ)^2 + (QR)^2$

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

$(PR)^2 = 9 + 16$

$PR = \sqrt{25}$

$PR = 5\,m$

$(TR)^2 = (TS)^2 + (RS)^2$

$(TR)^2 = (12)^2 + (9)^2$

$$(TR)^2 = 144 + 81$$
$$(TR)^2 = 225$$
$$TR = 15\text{m}$$

14. $$(2)^2 + (1.5)^2 = AB^2$$
$$4 + 2.25 = (AB)^2$$
$$6.25 = (AB)^2$$
$$2.5 = AB$$

So, total height is $2 + 2.5 = 4.5$ m

Check Your Mental Math IQ

1. 90°
2. $$65 + 85 + \angle 3 = 180°$$
$$\angle 3 = 180 - 150$$
$$\angle 3 = 30°$$
3. Let equal angles be 'x' , x
$$2x + 80° = 180°$$
$$2x = 100°$$
$$x = 50°$$
So, angle is 50°.
4. $$90 + 50 + \angle 3 = 180°$$
$$\angle 3 = 180° - 90° - 50°$$
$$\angle 3 = 40°$$
5. Let the ratio be x.
$$1x + 2x + 3x = 180°$$
$$6x = 180°$$
$$x = 30°$$
30°, 60°, 90°.
6. Let the angle be x and y
So, ATQ

$$x + y = 80°$$
$$x - y = 20°$$
$$2x = 100°$$
$$x = 50°$$
$$y = 80° - 50°$$
$$y = 30°$$

7. $(P)^2 = (40)^2 + (9)^2$
$= 1600 + 81$
$= 1681$
$(P)^2 = (41)^2$
$P = 41m$

Multiple Choice Questions (M.C.Q.)

1. (a) 60°
2. (a) scalene triangle
3. 3, 5, 7; Phythagorean triplets
$3^2 + 5^2 = 7^2$
$\therefore \quad 9 + 25 = 49$
$34 \neq 49$ So (a)
4. (b) 360°
5. (a) hypoteneuse
6. $\angle PRB = 30 + 60 = 90$ (exterior angle)
So (a)

12 Symmetry

Exercise 12A

1. (a) true (b) true (c) false
   (d) true

Exercise 12B

1. (a) 180°, two (b) 180°, two
2. (a) 3. 5
4. S, H, A show rotational symmetry at 180°
5. Parallelogram
6. (a) false (b) true (c) false
   (d) true

Check Your Mental Math IQ

1. Symmeterical 2. Infinite
3. Rotational

Multiple Choice Questions (M.C.Q.)

1. (b) 2. (a) 3. (b)
4. (d) 5. (c) 6. (a)
7. (a)

13 Representing 3D in 2D

Exercise 13A

1. (a) true (b) false (c) true
   (d) true
2.

	Shape	No. of faces	No. of edge	No. of vertex
(a)	Cuboid	6	12	8
(b)	Cube	6	12	8
(c)	Sphere	1	0	0
(d)	Cone	2	1	1
(e)	Cylinder	3	2	0

3. (a) V = 4, e = 4 (b) V = 0, e = 0
   (c) V = 7, e = 7 (d) v = 0, e = 2
   (f) v = 1, e = 1

Exercise 13C

2. (b) 3. (a)
5. (a) book, brick, bus, box
   (b) pipe, pen, jar, wire

Exercise 13D

1. (a) 10 (b) 10
2. 10 3. 49
4. Cubical tiles

Check Your Mental Math IQ

1. (a) 8 (b) tetrahedron
   (c) Square (d) figure have 4 faces
5. 7 6. cuboid

Multiple Choice Questions (M.C.Q.)

1. (b) 2. (b) 3. (c) 4. (d)
5. (c) 6. (a) 7. (b) 8. (b)

14 Congruence

Exercise 14A

1. $\angle AOC = \angle BOD$
2. $AB = PQ$; $PQ = 4$ cm
3. Yes
4. Yes
5. No
6. (a) true (b) false
7. $\angle POQ$

Exercise 14B

1. (a) $\Delta ABC \cong \Delta CDA$ (b) $\Delta ABC \cong \Delta ABD$
2. As
$$\begin{aligned} AB &= BC \\ \angle A = \angle B &= x^\circ \\ 120 + x + x &= 180^\circ \\ 2x &= 180 - 120 \\ 2x &= 60 \\ x &= 30^\circ \end{aligned}$$
5. (a), (b), (c) Yes
6. Yes, by SAs congruence rule
7. (a) $\angle p = 40^\circ$ (b) $\angle r = 120^\circ$ (c) $\angle q = 40^\circ$; $\angle P = 25^\circ$
8. (a) $x = 6, z = 8$ (b) $12 = x, y = 13$
11. (a) Yes
    (b) AC, CA; DC, BA; $\angle OCA$, $\angle BAC$
    (c) $\angle ACB$ (d) Yes

Check Your Mental Math IQ

1. Congruent
2. Shape and size equal

3. equal
4. $a = 110°, b = 3$ cm
5. BC

Multiple Choice Questions (M.C.Q.)

1. (b)
2. (d)
3. (a)
4. (b)
5. (a)

15 Constructions

Exercise 15B

2. $\angle R = 90°$
5. 40°
7. No

16 Mensuration

Exercise 16A

1. $\text{Perimeter} = 2(l+b)$
$= 2(18+25)$
$= 2(43)$
$= 86\text{cms}$

2. $\text{Perimeter} = 4\,(\text{sides})$
$32 = 4 \times \text{side}$
$\frac{32}{4} = \text{side}$
$\text{Side} = 8\,\text{cm}$

3. $b = 48\,\text{cm}$
$\text{Peremeter} = 3\text{km}\,72\,\text{m or}\,3072\,\text{m}$
$\text{Peremeter} = 2(\ell+b)$
$3072 = 2(\ell+48)$
$1536 = (\ell+48)$
$1536-48 = \ell$
$\ell = 1488\text{m}$

4. wire required for fencing is perimeter
i.e. $4\text{'S'} = 4 \times 14 = 56\,\text{m long}$

Exercise 14B

1. $\text{Circumfrence} = \pi d$
$32 = \frac{22}{7} \times d$
$\frac{132 \times 7}{22} = d$
$d = 42\,\text{cm}$

2. Circumference of wheel

distance = 121 km or 121000 m

$$\text{No. of revolutions} = \frac{\text{Total distance}}{\text{Circumference}}$$

$$\text{Circumference} = \frac{121000}{50000}$$

$$\pi d = \frac{121}{50}$$

$$\frac{22}{7} \times d = \frac{121}{50}$$

$$d = \frac{121}{50} \times \frac{7}{22}$$

$$= \frac{77}{100}$$

$$= 0.77 \text{ cm}$$

3. $\text{Circumference} = \pi d$

$$220 = \frac{22}{7} \times d$$

$$\frac{220}{22} \times 7 = d$$

$$d = 70 \text{ cm}$$

4. Circumference $= \pi d$

$$= \frac{22}{7} \times 7 = 22 \text{ cm}$$

5. Perimeter of square $= 4 \times 11 = 44$

Circurference of circle $= \pi d$

$$44 = \frac{22}{7} \times d$$

$$\frac{44 \times 7}{22} = d$$

$$d = 14 \text{ cm}$$

6. l = 8.9 cm or 89 mm; b = 54

$$\text{Perimeter} = 2(\ell + b)$$
$$= 2(89 + 54)$$
$$= 2(143)$$
$$= 286 \text{ mm}$$

$$\text{Circumfrence} = \frac{22}{7} \times 2 \times r$$

$$\frac{286 \times 7}{22 \times 2} = r$$

$$r = 45.5 \text{ mm}$$

7. Let radii be 9x and 16x.

$$\frac{\text{Circumfrence of 1}}{\text{Circumfrence of 2}} = \frac{2\pi 9x}{2\pi 16x} = \frac{9}{16} \text{ or } 9:16$$

8. Circumference of outer = $2\pi R$

$$132 = 2 \times \frac{22}{7} \times R$$

$$\frac{132 \times 7}{2 \times 22} = R$$

$$R = 21$$

Circumfrence of inner = $2\pi r$

$$88 = 2 \times \frac{22}{7} \times r$$

$$\frac{38 \times 7}{2 \times 22} = r$$

$$r = 14$$

difference = 21 – 14 = 7 cm

Exercise 16C

1. Area of tile = 10 cm × 10 cm = 100 cm

   Area of floor = 400 × 2.5 × 100 = 100000 cm^2

Total tile require $= \frac{100000}{100} = 1000$ tiles

2. $\text{Area} = (s)^2$

$1000000 \text{ sqm} = (s)^2$

$\sqrt{1000000} = s$

$1000\text{m} = s$

1 hectare = 10,000 sqm
100 hectare = 10,00,000 sqm

$\therefore$ 10 dam = 1 m; so 100 decametre.

3. $\ell = 2\ell$; $\quad B = 2b$

$\text{Area} = 4l \times b$

i.e. 4 times

4. Area = 28m; perimeter = 28m

Side of the rhombus $= \frac{\text{Perimetre}}{4} = \frac{28}{4} = 7m$

$\text{Altitude} = \frac{\text{Area}}{\text{Base}} = \frac{28}{7} = 4m$

5. Altitude of a parallelogram $= \frac{\text{Area}}{\text{Base}}$

So, $\text{Area} = \text{Base} \times \text{Altitude}$

$= 12 \times 8$

$= 96\text{m}^2$

6. a = 16 cm; $\quad \text{Area} = \frac{\sqrt{3}}{4} a^2$

$\text{Area} = \frac{\sqrt{3}}{4} \times (16)^2$

$= 110.85 \text{ cm}^2$

7. 17, 15, 8 cm

$(17)^2 = (15)^2 + (8)^2$

$289 = 225 + 64$

$289 = 289$

right angled Δs

$$= \frac{1}{2} \times 15 \times 8$$

$$\text{Area} = 60\,\text{cm}^2$$

8. $$\text{Area} = (\text{Side})^2$$
$$= 50 \times 50$$
$$= 2500\text{m}^2$$

9. $\text{Altitude} = \dfrac{\text{Area}}{\text{Base}} = \dfrac{2.25}{2.50} \times \dfrac{100}{10} = 90\text{cm} \text{ or } 0.90m$

10. $r = 50\text{m};\ R = 71\text{m}$

$$\text{Area} = A_1 - A_2$$
$$= \pi(R^2 - r^2)$$
$$= \pi[(71)^2 - (50)^2]$$
$$= \pi(5041 - 2500)$$

$$\frac{22}{7} \times 2541 = 7986\text{m}^2$$

$$\text{Area} = 7986\text{m}^2$$

Soil preparation cost = ₹2 per m^2

So, total cost = $7986 \times 2 = ₹15972$

Check Your Mental Maths IQ

1. Area of square $64 = (s)^2$
$$8 = s$$
$$\text{Perimeter} = 4 \times s = 4 \times 8 = 32\text{ cm}$$

2. $s = 2;$
$$\text{perimeter} = 4 \times s = 4 \times 2s = 8s \text{ or it doubles}$$

3. $$\text{Circunference} = 2\pi r$$
$$154 = \frac{2 \times 22}{7} \times r$$

$$\frac{154\times 7}{2\times 22} = r$$

$$r = \frac{49}{2} = 24.5 \text{ cm}$$

4. Area of rectangle ABCD – Area of circle

$(l\times b-\pi r^2)$

$$(10\times 6-\frac{22}{7}\times 3\times 3)$$

$$\frac{60}{1}-\frac{198}{7} = \frac{420-198}{7}$$

$$\frac{222}{7} = 31.71 \text{ cm}$$

Multiple Choice Questions (M.C.Q.)

1. $\text{Area} = \frac{1}{2}\times b\times h$

$$2I = \frac{1}{2}\times 6\times h = 3h$$

$$\frac{21}{3} = h$$

$$h = 7\text{cm (d)}$$

2. $s=\frac{s}{2}$

$\text{Area} = (s)^2$ $\frac{1}{4}$ of the original area

$= \left(\frac{s}{2}\right) or \frac{s^2}{4}$ (c)

3. $\frac{\text{Circumference of 1}}{\text{Circumference of 2}} = 2\pi\frac{r}{r} = \frac{5}{7} =$ 5 : 7 (d)

4. $l = 3l, b = b$

$\text{Area} = l\times b = 3l\times b$ Three times the original area

i.e. (b) 3

17 STATISTICS

Probability

Exercise 17A

1. Total outcomes = 17 + 16 = 33

$$\text{Probability of a girl's name} = \frac{\text{No of girls}}{\text{Total}}$$

$$= \frac{16}{33}$$

2. Total outcome = 300

$$\text{Probability of a baby boy} = \frac{\text{No of boys}}{\text{Total}}$$

$$= \frac{157}{300}$$

3. Total outcome = 6

(a) $$\text{Probability of getting '6' is} = \frac{\text{No of '6' india}}{\text{Total}}$$

$$= \frac{1}{6}$$

(b) No of possible value = 1, 2, 3, 4, 5, 6 *i.e.* 6

No of favourable outcome = 2, 4, 6 are even = 3

$$\text{Probability} = \frac{3}{6} = \frac{1}{2}$$

4. $$\text{Probability} = \frac{\text{No of favourable event}}{\text{No of possible event}}$$

$$0.016 = \frac{\text{No of favourable result}}{250}$$

$0.016 \times 250 =$ No of favourable results

No of favourable results = 4

i.e. Mahi farmly brought 4 tickets.

5. Total outcome is 7 day in a week.

$$\text{Probability} = \frac{\text{No of friday occur}}{\text{Total}}$$

$$= \frac{1}{7}$$

$$\text{(b) Probability} = \frac{\text{No of non - friday days}}{\text{Total}}$$

$$= \frac{6}{7}$$

6. Sample space

HH

HT

TH

TT

7. **Case I**

Total outcome = 2

$$\text{Probability} = \frac{\text{No of 'H' occur}}{\text{Total}}$$

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

Case II

Total outcome = 6

$$\text{Probability} = \frac{\text{No of 4 occur}}{\text{Total outcome}}$$

$$= \frac{1}{6}$$

$$\therefore \quad \frac{1}{2} > \frac{1}{6}$$

So, Case I is more.

8. $\text{Probability} = \dfrac{\text{No of head occur}}{\text{Total}}$

$= \dfrac{200}{500}$

$= \dfrac{2}{5}$

Check Your Mental Maths I.Q.

1. Principal of probability.
2. Experiment
3. random experiment
4. 0, 1
5. not definite
6. definite
7. Total = 9 letters

   (a) touch 'A' favourable = 4

   $\text{probability} = \dfrac{4}{9}$

   (b) touching L = 2

   $\text{probability} = \dfrac{2}{9}$

   (c) touching D = 1

   $\text{Probability} = \dfrac{1}{9}$

8. Total outcome = 6

   favourable even outcome = 2, 4, 6, i.e. 3

   possible outcome = 3

   $\text{probability} = \dfrac{3}{6} = \dfrac{1}{2}$ (b)

Multiple Choice Questions (M.C.Q.)

1. Total = 3 + 25 + 7 = 35

   $\text{Probability} = \dfrac{\text{No of Red}}{\text{Total}} = \dfrac{3}{35}$ (b)

2. Total = 11

$$\text{Probability} = \frac{\text{No of M}}{\text{Total}} = \frac{2}{11} \quad \text{(a)}$$

3. Total = 6

$$\text{Probability} = \frac{\text{No of 6 occur}}{\text{Total}} = \frac{1}{6}$$

4. $$\text{Probability} = \frac{\text{No of favourable}}{\text{No of possible}} \quad \text{(a)}$$

$$= \frac{5}{200} = \frac{1}{40} \quad \text{(a)}$$

18 Data Handling

Exercise 18A

3. (a) 3 (b) 9.5
   (c) upper class limit = 14
   lower class limit = 11
4. 3, 6, 9, 10, 3, 3, 11, 5
6. (a) lower limit of IInd class = 10
   (b) upper limit of 4th class = 40
   (c) class mark of 8th class = 75
   (d) class mark of 5th class = 45
   (e) class size = 10

Exercise 18B

1. Arithmetic mean $= \dfrac{7+10+15+11+12+14+8}{7}$

$= \dfrac{77}{7} = 11$

2. Multiples of 6, 10 = 10, 20, 30, 40, 50

Mean $= \dfrac{150}{5} = 30$

3. $\dfrac{1+0+2+3+0+2+3+4+0+2+5}{11}$ mean $= \dfrac{22}{11} = 2$

$$\text{Median} = \left(\frac{11+1}{2}\right) = \frac{12}{2} = 6$$

Arranging data in ascending order=0, 0, 0, 1, 2, 2, 2, 3, 3, 4, 5
Value = 2

4.

x	f	xf
115	5	115×5
125	25	125×25
135	4	135×4
145	6	145×6
155	40	155×40
165	20	165×20
	Σf **100**	Σxf **14610**

$$\text{Mean} = \frac{14610}{100} = 146.1$$

5. $\text{Median} = \frac{9+1}{2} = 5th$

Arranging the data in ascending order, we have
41, 43, 57, 58, 61, 71, 92, 99, 127,
5th one is = 61; so median = 61 Ans.

6. $$\text{Mean} = \frac{3\times3+6\times5+10\times1+12\times8+7\times13+15\times10}{3+5+1+8+13+10}$$

$$= \frac{386}{40} = 9.65$$

$$\text{Median} = \frac{\left[\frac{40\text{th item}}{2}\right] + \left[\frac{40}{2}+1\right]\text{th item}}{2}$$

$$\text{Median} = \frac{20\text{th item} + 21\text{th item}}{2} = \frac{7+7}{2} = 7$$

7. Mode = 6
8. Mean = 20; Median = 25; Mode = ?

$$\text{Mode} = 3 \times \text{median} - 2 \times \text{mean}$$
$$= 3 \times 25 - 2 \times 20$$
$$= 75 - 40 = 35$$

9. Frequency 9 is the highest, so mode = 52

10. Mean $= \frac{2+5+3+3+0+18+5+7+11+15+1+13+0+8+0}{15}$

$$= \frac{91}{15} = 60.6$$

$$\text{Median} = \frac{15+1}{2} = 8\text{th item}$$

Arranging the data in the ascending order

0, 0, 0, 1, 1, 2, 3, 3, 5, 5, 7, 8, 11, 13, 15, 18

8th item is = 5

Mode = 0 {frequency = 3 is the highest of 0 marks)

Exercise 18C

2. (a) The bar graph shows the area of 5 regions on earth.
   (b) India, 44 million km^2
   (c) 16 million km^2
   (d) 16 million km^2
5. (a) Most popular game among 200 students of a school.
   (b) cricket, 60
   (c) volley ball, 20
   (d) 20
   (v) 60 : 30 = 2 : 1

Check Your Mental Math I.Q.

1. $\frac{2+4+6+8+10}{5} = \frac{30}{5} = 6$

2. First 11 even natural numbers are

   2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22

$$\text{Median} = \frac{11th+1}{2} = 6th = 12$$

3. Mode 21 {Frequency = 3}

4. $$\text{Mean} = \frac{4+2+7+3+x}{5}$$

$$4 = \frac{4+2+7+3+x}{5}$$

$$4 \times 5 = 16 + x$$

$$x = 20 - 16 = 4$$

5. Prime numbers from 1 to 50 are

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47

$$\text{Mean} = \frac{\text{Sum of numbers}}{\text{Total Numbers}} = \frac{328}{15} = 21.86$$

Multiple Choice Questions (M.C.Q.)

1. (b)

2. $\frac{2+4+6+8+10}{5} = \frac{30}{5} = 6$ (d)

3. $\frac{2+3+5+7}{4} = \frac{17}{4} = 4.25$ (b)

4. $\frac{1+3+5+7+9}{5} = \frac{25}{5} = 5$ (a)

5. (d)