

P6

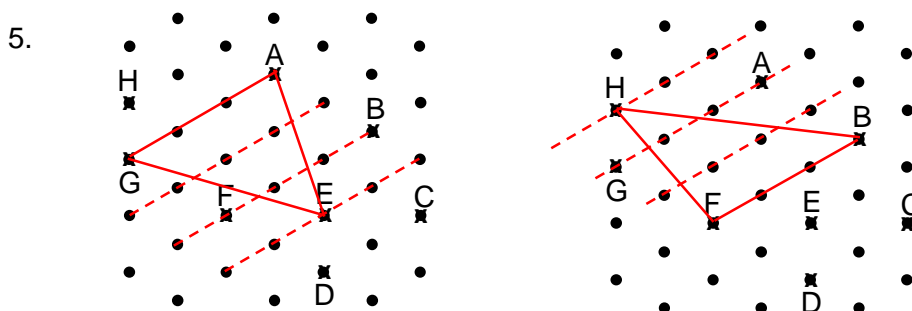
1. The last digits of the rows are 9, 7, 1 and 3 repeated in sets of 4.
 Since 100 is divisible by 4, Row 100 ends with the last digit of the set, which is 3.

2. $y \bullet (y \circ 4)$
 $= y \bullet (4y - 1)$
 $= y + (4y - 1) - 1$
 $= 5y - 2$
 $5y - 2 = 33$
 $y = 7$

3. The total of the row totals has to be the same as the total of the column totals, giving:
 $20 + 14 + 12 = 17 + P + Q$
 $P + Q = 46 - 17$
 thus $P + Q = \underline{29}$

A	B	C	20
D	E	F	14
G	H	I	12
17	P	Q	

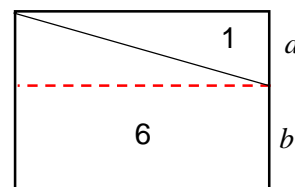
4. If the newspaper consists of 24 pages, then pages 1 and 2 have to be on the same sheet as pages 23 and 24; pages 3 and 4 on same sheet together with pages 21 and 22 and so on. Thus pages 6 and 20 are on the same sheet together with pages 5 and 19.



Taking AG (3 units) as the base of triangle AGE, E is 3 rows away from AG. Similarly, taking BF (3 units) as the base of triangle BFH, H is 3 rows away from BF. Since triangle BFH has the same base and the same height as triangle AGE, their areas are the same. The 3 points are B, F and H.

6. The tree that we are looking for has to be between 2 houses and that there are as many houses on both sides of the tree, for the shortest distance. The answer is therefore, D.

7. Upper rectangle has area 2 unit².
 Lower rectangle has area 6 - 1 = 5 unit².
 Ratio of area of the upper rectangle to area of the lower rectangle is 2 : 5. Since the length is the same for both rectangles, then a and b are also in the ratio 2 : 5.



8. Total number of oranges = $2mp$.
 Oranges lost = $2mp - \frac{3}{4}mp = \frac{5}{4}mp$
 Fraction of oranges lost = $\frac{\frac{5}{4}mp}{2mp}$
 $\frac{5}{4} \div 2 = \frac{5}{4} \times \frac{1}{2} = \frac{5}{8}$
 Percentage of oranges lost = $\frac{5}{8} \times 100\% = \underline{62.5\%}$

9. $\frac{1}{6} < \frac{x}{5} < \frac{2}{3}$
 $\frac{5}{30} < \frac{6x}{30} < \frac{20}{30}$

Since $6x$ is less than 20, then the largest whole number value of $6x$ is 18, and the largest whole number value of x is 3.

10. If you try 3 keys on the 1st lock, you will know that the 4th key is a match. So, you only need a maximum of 3 tries. Similarly, the 2nd lock needs a maximum of 2 tries and the 3rd lock needs only 1 try.
 Thus, $3 + 2 + 1 = \underline{6 \text{ tries}}$ are needed.

11. There are two sequences of numbers within the given number sequence.
 The odd-numbered terms form this sequence: 1, 5, 9, 13, 17 ... where the numbers are $(2n - 1)$, where n is the number of terms.
 The even-numbered terms form this sequence: 3, 6, 9, 12, 15 ... where the numbers are multiples of 3.
 Since 401 is not a multiple of 3, we know that it was an odd-numbered term.
 Hence, $2n - 1 = 401$
 $2n = 402$
 $n = 201$
 Therefore, the number 401 is the 201st term.

12. The ages that are possible for these children are
 4 5 6 7 8 9 10 years old

If the oldest is a boy and he is 10, then the youngest girl is 6 and the youngest boy is 4 and the oldest girl is 8.

That is,

4 5 6 7 8 9 10
 youngest youngest oldest oldest
 boy girl girl boy

However, this is not possible as there are not enough ages between the oldest and youngest girl for the other 2 girls.

Hence, the oldest is a girl and she is 10, the youngest boy is 6, the youngest girl is 4, and the oldest boy is 8 years old. The other 2 girls can be between the ages of 5 and 9.

4 5 6 7 8 9 10
 youngest youngest oldest oldest
 girl boy boy girl

13. 7 old units + 70¢ = 7 new units
 3 old units + 30¢ = 3 new units
 3 old units + 70¢ = 4 new units
 1 new unit = 40¢
 Bar of chocolate: 7 old units = $(7 \times 40¢) - 70¢ = \underline{\$2.10}$
 1 old unit = $210¢ \div 7 = 30¢$
 Pack of sweets: 3 old units = $30¢ \times 3 = \underline{\$0.90}$
14. $800 - 10x$ increased by 10% gives:
 $1.1 \times (800 - 10x) = 880 - 11x$
 Therefore, $600 - 6x = 880 - 11x$
 $5x = 280$
 $x = 56$
15. Lowest common multiple of the two numerators 2 and 3 is 6.
 Let area of triangle of triangle of BCE be 6 unit².
 Then area of ABED = $20 - 6 = 14$ unit² and area of BCEFG = $15 - 6 = 9$ unit².
 $\frac{\text{difference in area}}{\text{area of triangle}} = \frac{14-9}{6} = \frac{5}{6}$
16. Since a and b are consecutive numbers and $\frac{1}{a} - \frac{1}{b} = \frac{1}{42}$, then $\frac{1}{ab} = \frac{1}{42}$ and $a = 6$ and $b = 7$.

$$\frac{1}{a} - \frac{1}{b} - \frac{1}{c}$$

$$= \frac{bc-ac-ab}{abc}$$

$$= \frac{7c-6c-42}{42c}$$

$$= \frac{c-42}{42c}$$

$$= \frac{6}{2016}$$
 Since $42c = 2016$, then $c = \underline{48}$
17. The total of the original three numbers is $18 \times 3 = 54$. The new total becomes $23 \times 3 = 69$. The total has increased by 15 because a number was replaced by 38. So, the original number must be $38 - 15 = \underline{23}$
18. The times the hour hand and the minute hand of a clock form a right angle with each other between 0600 and 1200 are approximately at 0617; 0649; 0722; 0754; 0828; 0900; 0933; 1005; 1038; 1111; 1149
 Note: This happens twice every hour, except between 0800 and 1000 when it happens only three times and not four times as expected. This is because at 0900 exactly the hands form a right angle.
 Thus between 0600 and 1200 there are $(6 \times 2) - 1 = \underline{11}$ times.
19. Area of the surfaces viewed from the top = $10 \times 10 = 100$ cm²
 Area of 1 side of bottom cube = $10 \times 10 = 100$ cm²
 Area of 1 side of middle cube = $10 \times 10 \div 2 = 50$ cm²
 Area of 1 side of top cube = $10 \times 10 \div 2 \div 2 = 25$ cm²
 Total surface area = $(100 \times 6) + (50 \times 4) + (25 \times 4) = 900$ cm²

20. If the volume of the 20% concentration salt solution (2 units of 10 units) taken and the volume of 5% concentration salt solution (0.5 units of 10 units) taken were the same, the resultant mixture would be of 12.5% concentration (2.5 units of 20 units \rightarrow 1.25 units of 10 units) and not 15% concentration.

However, if the volume of 20% concentration salt solution taken is double (4 units out of 20 units) the amount of 5% concentration salt solution (0.5 units out of 10 units) taken, then the resultant mixture is 15% concentration (4.5 units out of 30 units \rightarrow 1.5 units of 10 units).

4.5 units \rightarrow 900 g
 4 units (from Tank A) $\rightarrow (900 \div 4.5) \times 4 = \underline{800 \text{ g}}$

21. The pattern for the first few diagrams is $\frac{1}{1}$; $\frac{3}{4}$; $\frac{6}{9}$; $\frac{10}{16}$; $\frac{15}{25}$.

The numerators are the sums of consecutive numbers,
 that is $3 = 1 + 2$;
 $6 = 1 + 2 + 3$;
 $10 = 1 + 2 + 3 + 4$ and so on.

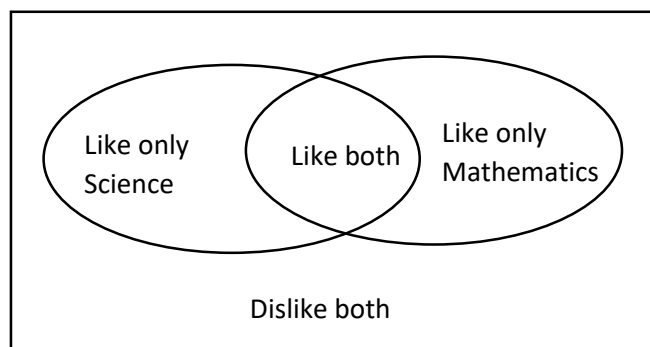
The denominators are square numbers,
 that is $4 = 2 \times 2$;
 $9 = 3 \times 3$;
 $16 = 4 \times 4$ and so on.

The numerator for the 50th fraction is $1 + 2 + 3 + \dots + 50 = \frac{50 \times (50+1)}{2} = 1275$

The denominator for the 50th fraction is $50 \times 50 = 2500$.

Hence the fraction is $\frac{1275}{2500} = \frac{51}{100}$

- 22.



Number of students who like Science = $240 \div (5 + 3) \times 5 = 150$

Number of students who like only Science = $150 - 86 = 64$

Number of students who like Mathematics = $240 \div (7 + 5) \times 7 = 140$

Number of students who like only Mathematics = $140 - 86 = 54$

Number of students who dislike both Science and Mathematics = $240 - (64 + 86 + 54) = \underline{36}$

23. Assume the three colours are red, blue and yellow.

The 4 different combinations for Red and Blue are

R	R	R	R	B
R	R	R	B	B
R	R	B	B	B
R	B	B	B	B

There are 3 ways to choose 2 out of 3 colours: red-and-blue,
blue-and-yellow
red-and-yellow

So the different colour combinations for 5 sweets is $4 \times 3 = 12$ combinations

Hence, the largest possible number of pupils is 12.

24. Compare Pat's guess with Tim's guess:

If Sam is 2nd, then Tim's guess of Qin being 2nd and Sam being 5th are both wrong.
Therefore Sam has to be 5th (as correctly guessed by Tim) and Qin has to be 3rd (as correctly guessed by Pat).

So if Sam is 5th, then based on Roy's guess, Pat cannot be 5th and so Roy correctly guessed that Tim is 1st.

Knowing that Tim is 1st, then based on Qin's guess, Tim cannot be 4th so Qin correctly guessed that Roy is 2nd.

Finally, Pat has to be 4th.

Therefore, the order is Tim, Roy, Qin, Pat, Sam

25. Fraction of the job done by Alan = $\frac{1}{20} \times (14 - 2.5) = \frac{23}{40}$

$$\text{Fraction of the job done by Ben} = 1 - \frac{23}{40} = \frac{17}{40}$$

$$\text{Number of days Ben worked} = \frac{17}{40} \div \frac{1}{30} = 12\frac{3}{4} \text{ days}$$

$$\text{Number of days Ben rested} = 14 - 12\frac{3}{4} = 1\frac{1}{4} \text{ days}$$