SECTION A (50 Marks)

1. Consider the ten numbers: 1, 5, 8, 19, 47, 51, 111, 216, 999, 1000.

   Write down

   (a) the composite numbers,

   (b) the perfect cubes.

   Ans: (a) _____ [2]

   (b) _____ [2]

2. Find the value of $\sqrt[3]{13824}$ by using prime factorisation.

   Ans: _____ [3]

3. If p and q are whole numbers such that $p \times q = 37$, **find** the value of $p + q$ and **explain** your answer.

Ans: $p + q =$ _____ [1]

Explain: _____ [2]

_____

4. (a) Determine whether the statement "If 2 and 4 are factors of a number, then 8 is also a factor of that number" is **true or false**.

(b) If it is true, explain your reasoning. If it is false, give a counterexample.

Ans: (a) The above statement is _____. [1]

(b) _____ [1]

5. Consider the eight numbers: $(-0.5)^2$, 0, $\sqrt[3]{-9}$, $\dfrac{18}{5}$, $\sqrt{100}$, $(-4)^3$, 17, $-\dfrac{24}{3}$.

Write down

(a) the positive numbers,

(b) the integers.

Ans: (a) _____ [2]

(b) _____ [2]

6.   (a)   Showing your working, express $100 \times 0.5\dot{7}$ as a repeating decimal.

(b)   Hence, find the value of $100 \times 0.5\dot{7} - 0.5\dot{7}$.

Ans: (a)   _____   [2]

(b)   _____   [2]

7.   Factorise the algebraic expression $4a - 8(b - 2c)$ completely.

Ans: _____   [2]

8. (a) If $z = -3^x - y^3$, find the value of z when $x = 2$ and $y = -3$.

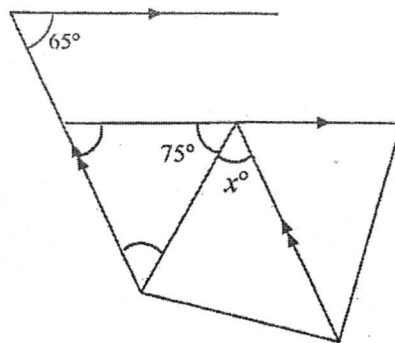   (b) Simplify $(-2a) \times (-3b) + 5ba - 7a + 4b \times (-a) - a$.

   Ans: (a) $z =$ _____ [2]

   (b) _____ [2]

5

9. Solve the equation $\dfrac{2x+1}{x-3} = 2\dfrac{1}{3}$.

Ans: $x =$ _____ [3]

10. Explain clearly in the space provided why $x = 40$ in the figure below. Show your working and reasoning clearly.

[3]

11. If the sum of the interior angles of a decagon (10-sided) is greater than the sum of the interior angles of another regular polygon by $540°$, find the number of sides of the polygon.

Ans: No. of sides = _____ [3]

12. An object moves 7.2 km in 1 hour. Find its speed in

   (a)   metres per minute,

   (b)   centimetres per second.

                                   Ans: (a)   _____ m/min   [2]

                                          (b)   _____ cm/s   [2]

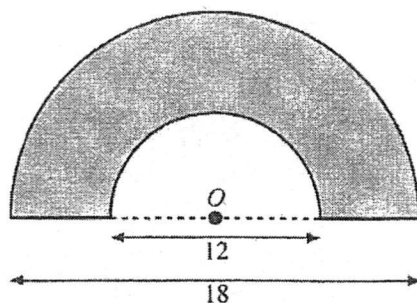13. (a)   Solve the inequality $8x - 11x > -9$.

   (b)   Illustrate the above solutions on a number line.

   (b)   [1]

                                   Ans: (a)   _____   [2]

14. The diagram shows two semicircles with the same centre O. Measurements are in metres.

Find, **in terms of π,**

(a) the perimeter of the shaded region,

(b) the area of the shaded region.

Ans: (a) _____ m [2]

(b) _____ m² [2]

15. Tasnim earns $85 on selling 80 tins of biscuits. If Tasnim bought 100 tins of biscuits for $425, calculate

    (a)   the cost of one tin of biscuits that Tasnim paid,

    (b)   the profits of one tin of biscuits as a percentage of its cost.

Ans: (a) $ _____ [1].

              (b)   _____ % [3]

SECTION B (50 Marks)

1. Ms Lim has 200 g of red plasticine, 380 g of grey plasticine and 420 g of yellow plasticine. She divided the plasticine into small balls of equal mass for her Art lesson.

   Find

   (a) the largest possible mass of one small ball of plasticine,

   (b) the number of plasticine balls she obtained for each colour.

   Ans: (a) _____ g   [3]

         (b) _____ red balls   [1]

              _____ grey balls   [1]

              _____ yellow balls   [1]

11

2. (a) Construct $\triangle ABC$ such that $AB = 5.5$ cm, $BC = 10$ cm and $AC = 5.5$ cm. [2]

    (b) Construct the perpendicular bisector of AC. [1]

    (c) Construct the angle bisector of $\angle CAB$. [1]

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(d) Qi Yun, Erni, Kwan Pin and Zeti share a sum of money. Qi Yun takes $\frac{1}{5}$ of the sum of money. After Qi Yun has taken her share, Erni takes $\frac{1}{3}$ of the remaining money. After Erni has taken her share, Kwan Pin takes $\frac{1}{4}$ of the remaining money. After Kwan Pin has taken her share, Zeti takes all of the remaining money. What fraction of the sum of money is Zeti's share?

Ans: **(d)** _____ [4]

3.	(a)	The marks scored by a class of 20 students in a Mathematics test are as follows:

49	46	69	61	49
50	45	62	57	69
68	60	49	59	57
68	45	55	46	50

Copy and complete the frequency table below.	[2]

Marks (x)	Tally	Frequency
$45 \leq x < 50$		
$50 \leq x < 55$		
$55 \leq x < 60$		
$60 \leq x < 65$		
$65 \leq x < 70$		

(b)	Mei Xuan conducted a survey among a group of students who travel to school either by bus or by car. She displayed the data collected with a pictogram shown below.

Bus

Car
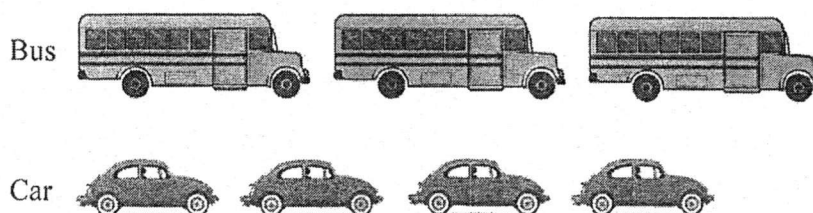
what is a possible misinterpretation of the above data and
how would you modify the above pictogram to avoid ē misinterpretation?
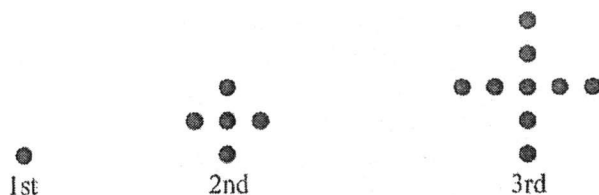
Ans: _____

_____ [2]

4. Mave drove for a distance of 135 km at a speed of x km/h and Charmaine drove for a distance of 120 km at a speed 10 km/h slower than Mave. Given that the **time taken** by the both of them are the **same**, find the speed each of them drove at.

Ans: **Mave:** _____ km/h

            Charmaine: _____ km/h [5]

5.   The diagram below shows the first three of a sequence of dot patterns.

1st   2nd   3rd

(a)   The information from the sequence of dots is tabulated below.

       Complete the table.   [1]
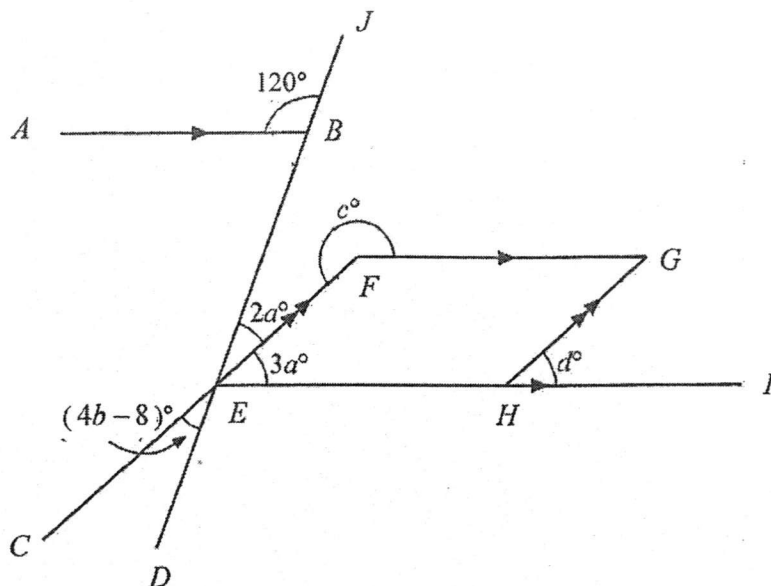
Pattern	Formula	Number of dots
1	1	1
2	$4 + 1$	5
3	$4 + 4 + 1$	9
4		

(b)   Write down a formula, T_n to calculate the number of dots in the nth pattern.

(c)   Hence, find the number of dots in the 25th pattern.

(d)   Find the value of m if there are 501 dots in the mth pattern.

Ans: (b) $T_n =$ _____   [2]

       (c)   _____ dots   [1]

       (d) $m =$ _____   [2]

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6. (a) Find the values of a, b, c and d in the figure below.

   (b) What type of angle is $c°$?

Ans: (a) a = _____ [2]
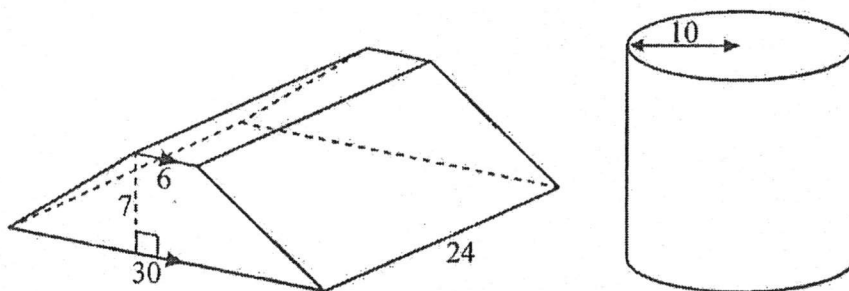
b = _____ [2]

c = _____ [2]

d = _____ [1]

(b) _____ angle [1]

17

7. A solid prism whose cross section is a trapezium is moulded into a solid cylinder of radius 10 cm. All dimensions given in the diagram are in centimetres.

(a) Find the height of the cylinder, giving your answer correct to 3 significant figures.

(b) Find the total surface area of the cylinder, giving your answer correct to the nearest whole number.

Ans: (a) _____ cm   [4]

  (b) _____ cm² [3]

8. The line graph below shows the change in body temperature of a patient from 8 am to 11 pm. The temperatures are taken every 3 hours. The normal temperature of a person is approximately 37°C.

Patient's Body Temperature
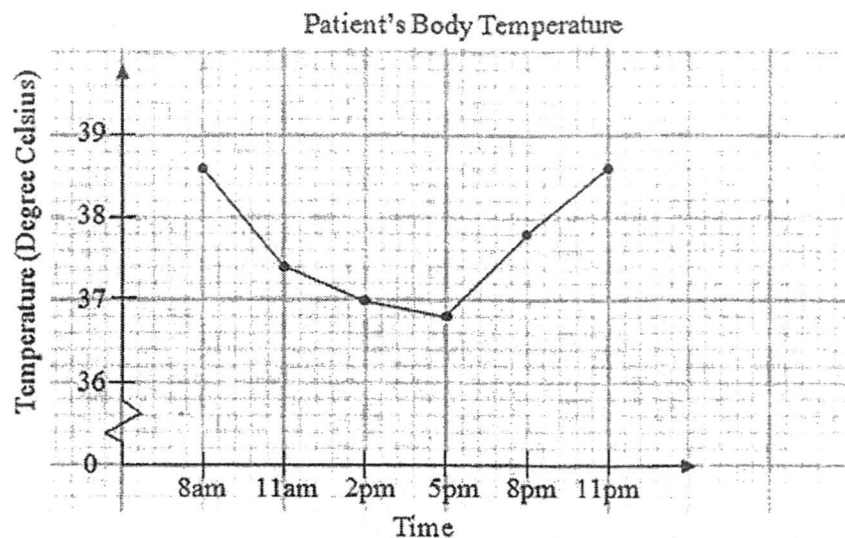
(a) State the time taken (in hours) for his temperature to decline till it reaches normal temperature.

(b) State a possible reason for the drop in the patient's temperature.

Ans: _____ [1]

(d) Find the percentage increase in temperature from 5pm to 8pm.

(e) Do you think the patient has recovered by 11 pm? Explain your answer.

Ans: _____ [2]

Ans: (a) _____ hours [1]

(d) _____ % [2]

--END OF PAPER--

SETTER: Ms Chow CW

19

SECTION A (50 Marks)

1. Consider the ten numbers: 1, 5, 8, 19, 47, 51, 111, 216, 999, 1000.

    Write down

    (a)   the composite numbers,

    (b)   the perfect cubes.

※ Deduct one mark
for every error.

Ans: (a) $\underline{8, 216, 999, 1000, 51, 111}$ [2] B2

(b) $\underline{1, 8, 216, 1000.}$ [2] B2

2. Find the value of $\sqrt[3]{13824}$ by using prime factorisation.

$$13824 = 2^9 \times 3^3 \qquad [M1]$$

$$\sqrt[3]{13824} = \sqrt[3]{2^9 \times 3^3}$$

$$= 2^3 \times 3^1 \qquad [M1]$$

$$= 24.$$

Ans: $\underline{24.}$ [3] A1

2

3. If p and q are whole numbers such that $p \times q = 37$, **find** the value of $p+q$ and **explain** your answer.

$p \times q = 37$

$1 \times 37 = 37$.

$\therefore p+q = 1+37$

$= 38$.

Ans: $p+q =$ _____ 38. _____ [1] A1

$[B1]$

Explain: _Since 37 is a prime number, it only has_ [2]

two factors > 1 and 37 itself. [B1] .

4. (a) Determine whether the statement "If 2 and 4 are factors of a number, then 8 is also a factor of that number" is **true or false**.

(b) If it is true, explain your reasoning. If it is false, give a counterexample.

Ans: (a) The above statement is ____ false . ____ [1] B1

(b) _If 4 is the number, 8 cannot be a_ [1] B1
factor of 4.

5. Consider the eight numbers: $(-0.5)^2, 0, \sqrt[3]{-9}, \dfrac{18}{5}, \sqrt{100}, (-4)^3, 17, -\dfrac{24}{3}$.

Write down

(a) the positive numbers,

(b) the integers.

※ Deduct one mark for every error.

Ans: (a) _$(-0.5)^2, \dfrac{18}{5}, \sqrt{100}, 17$._ [2] B2

(b) _$0, \sqrt{100}, (-4)^3, 17, -\dfrac{24}{3}$_ [2] B2

3

6. (a) Showing your working, express $100 \times 0.5\dot{7}$ as a repeating decimal.

(b) Hence, find the value of $100 \times 0.5\dot{7} - 0.5\dot{7}$.

(a) $100 \times 0.5\dot{7} = 100 \times 0.575757$ [M1]   (a) $100 \times 0.5\dot{7}$

$= 57.5757$ $= 100 \times \frac{19}{33}$ [M1]

$= 57.5\dot{7}$ $= 57.5757$

                    $= 57.5\dot{7}$

(b) $100 \times 0.5\dot{7} - 0.5\dot{7}$

$= 57.5\dot{7} - 0.5\dot{7}$ [M1]

$= 57$

Ans: (a) ___$57.5\dot{7}$___ [2] A1

(b) ___57___ [2] A1

7. Factorise the algebraic expression $4a - 8(b - 2c)$ completely.

$4a - 8(b - 2c)$

$= 4a - 8b + 16c$ [M1]

$= 4(a - 2b + 4c)$

Ans: ___$4(a - 2b + 4c)$___ [2] A1

4

(a)   If $z = -3^x - y^3$, find the value of z when $x = 2$ and $y = -3$.

(b)   Simplify $(-2a) \times (-3b) + 5ba - 7a + 4b \times (-a) - a$.

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

$= -3^2 - (-3)^3$ [M1]

$= -9 - (-27)$

$= -9 + 27$

$= 18$

(b) $(-2a) \times (-3b) + 5ba - 7a + 4b \times (-a) - a$

$= \quad 6ab \quad + 5ba - 7a + (-4ab) - a$ [M1].

$= 6ab - 4ab + 5ba - 7a - a$

$= 7ab - 8a$.

Ans: (a) $z =$ ___18.___   [2] A1

(b)   ___$7ab - 8a$.___   [2] A1

5

(4)

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9. Solve the equation $\dfrac{2x+1}{x-3} = 2\dfrac{1}{3}$.

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

$$\frac{3(2x+1)}{3(x-3)} = \frac{7(x-3)}{3(x-3)} \searrow$$

either step can get [M1].

$$3(2x+1) = 7(x-3) \nearrow$$
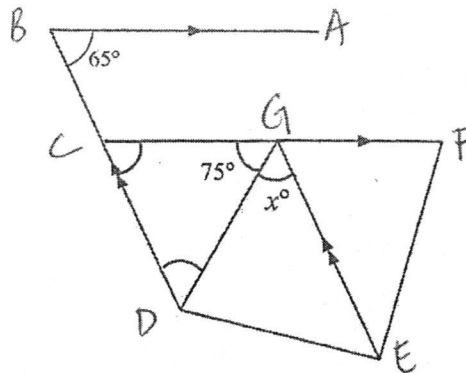
$$6x + 3 = 7x - 21$$

$$6x - 7x = -21 - 3 \cdot [M1].$$

$$-x = -24.$$

$$x = 24.$$

Ans: $x = $ ___24___ [3] A1

6

10. Explain clearly in the space provided why $x = 40$ in the figure below. Show your working and reasoning clearly.

$\angle DCG = 65°$ (corr $\angle s$, AB // FC) [M1]

$\angle CDG = 180° - 65° - 75°$ ($\angle$ sum of $\triangle$) [M1]
$= 40°$

$\angle x = 40°$ (alt $\angle s$, CD // GE) [A1]

$\therefore x = 40$ [3]

11. If the sum of the interior angles of a decagon (10-sided) is greater than the sum of the interior angles of another regular polygon by $540°$, find the number of sides of the polygon.

Sum of int $\angle s$. of decagon
$= (10-2) \times 180°$ [M1]
$= 1440°$

Sum of int $\angle s$ of another polygon
$= 1440° - 540°$
$= 900°$

$(n-2) \times 180° = 900°$ [M1]
$n-2 = 900° \div 180°$
$= 5.$
$n = 5+2$
$= 7.$

Ans: No. of sides = _____7_____   [3] A1

7

12. An object moves 7.2 km in 1 hour. Find its speed in

    (a)   metres per minute,

    (b)   centimetres per second.

(a)   1 hour = 7.2 km.

    60 mins = 7200 m [M1]

    1 min = 7200 ÷ 60

        = 120 m.

(b)   60 mins = 7200 m

    3600 s = 720 000 cm [M1]

    1 s = 720 000 ÷ 3600

       = 200 cm.

✳ Part (b) can ECF for M1 if students used wrong part (a) answer.

Ans: (a) _____120_____ m/min [2] A1

    (b) _____200._____ cm/s [2] A1

13. (a) Solve the inequality $8x - 11x > -9$.
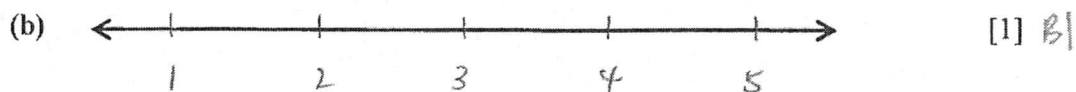
    (b) Illustrate the above solutions on a number line.

(a) $8x - 11x > -9$

    $-3x > -9$ [M1]

    $x < -9 ÷ (-3)$

    $x < 3$.

$x < 3$

(b) [number line with arrow pointing left from 3] [1] B1

1   2   3   4   5

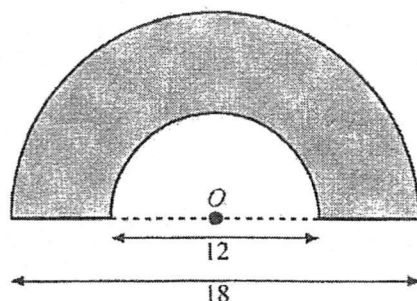✳ ECF given for correct number line.

Ans: (a) _____$x < 3$_____ [2] A1

14. The diagram shows two semicircles with the same centre O. Measurements are in metres.

Find, **in terms of π**,

(a) the perimeter of the shaded region,

(b) the area of the shaded region.

(a) Circumference of big semicircle
$$= \pi(9)$$
$$= 9\pi.$$

↓ either step can
Circumference of small semicircle ↗ get [M1].
$$= \pi(6)$$
$$= 6\pi.$$

∴ Perimeter $= 9\pi + 6\pi + 3 + 3$
$$= 15\pi + 6.$$

(b) Area of big semicircle
$$= \tfrac{1}{2} \times \pi \times (9)^2$$
$$= 40.5\pi.$$

either step
can get [M1] Area of small semicircle
$$= \tfrac{1}{2} \times \pi \times (6)^2$$
$$= 18\pi.$$

∴ Shaded area $= 40.5\pi - 18\pi$
$$= 22.5\pi.$$

Ans: (a) ____(15π + 6)____ m [2] A1

(b) ____22.5π____ m² [2] A1

④

9

15. Tasnim earns $85 on selling 80 tins of biscuits. If Tasnim bought 100 tins of biscuits for $425, calculate

   (a)   the cost of one tin of biscuits that Tasnim paid,

   (b)   the profits of one tin of biscuits as a percentage of its cost.

(a)   100 tins = $425.

   1 tin = $425 ÷ 100
       = $4.25.

(b)   80 tins = $85.

   1 tin = $85 ÷ 80   [M1].
       = $1.0625.

$$\frac{earning}{cost} \times 100\% = \frac{1.0625}{4.25} \times 100\%   [M1].$$
$$= 25\%.$$

Ans: (a) $ __4.25.__   [1] A]

       (b)   __25.__ %   [3] A]

10

1.   Ms Lim has 200 g of red plasticine, 380 g of grey plasticine and 420 g of yellow plasticine. She divided the plasticine into small balls of equal mass for her Art lesson.

Find

(a)   the largest possible mass of one small ball of plasticine,

(b)   the number of plasticine balls she obtained for each colour.

(a) $200 = 2^3 \times 5^2$

$380 = 2^2 \times 5 \times 19.$ $\Big\}$ [M1]

$420 = 2^2 \times 3 \times 5 \times 7$

$HCF = 2^2 \times 5$ [M1]

$= 20.$

(b) $Red = 200 \div 20$

$= 10.$

$Grey = 380 \div 20$

$= 19.$

$Yellow = 420 \div 20$

$= 21$

Ans: (a)   ___20___ g   [3] A1

(b)   ___10___ red balls   [1] A1
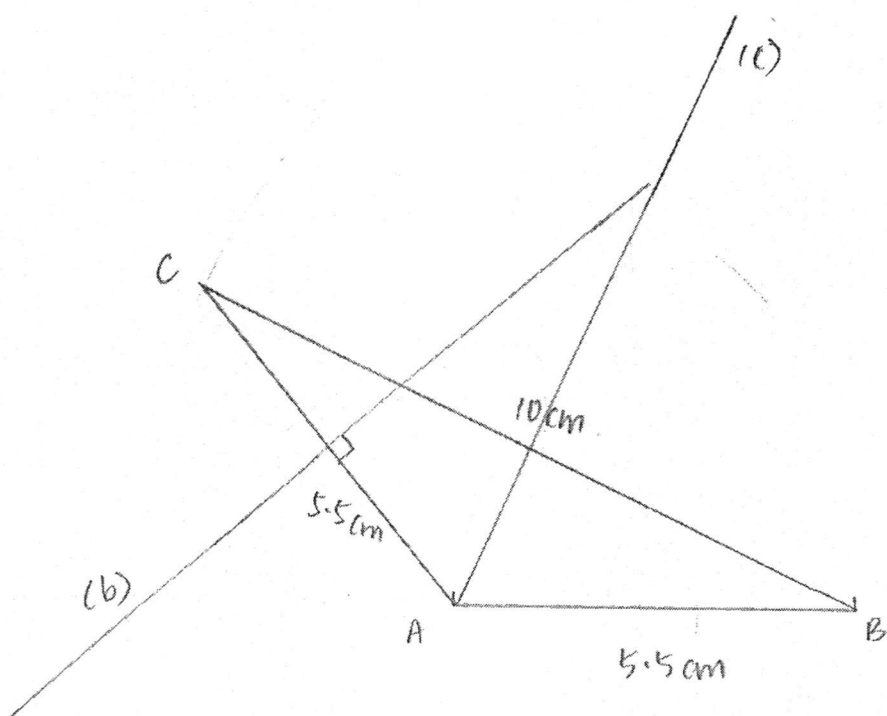
___19___ grey balls   [1] A1

___21___ yellow balls   [1] A1

11

2.   (a)   Construct $\triangle ABC$ such that $AB = 5.5$ cm, $BC = 10$ cm and $AC = 5.5$ cm.   [2] B2

       (b)   Construct the perpendicular bisector of AC.   [1] B1

       (c)   Construct the angle bisector of $\angle CAB$.   [1] B1

※ labels and arcs have to be present.

(c)

C

10cm

5.5cm

(b)

A   5.5 cm   B

(4)

(d)   Qi Yun, Erni, Kwan Pin and Zeti share a sum of money. Qi Yun takes $\frac{1}{5}$ of the sum of money. After Qi Yun has taken her share, Erni takes $\frac{1}{3}$ of the remaining money. After Erni has taken her share, Kwan Pin takes $\frac{1}{4}$ of the remaining money. After Kwan Pin has taken her share, Zeti takes all of the remaining money. What fraction of the sum of money is Zeti's share?

After Qiyun, $1 - \frac{1}{5} = \frac{4}{5}$.

Erni $= \frac{1}{3} \times \frac{4}{5}$ [M1].

$\quad = \frac{4}{15}$.

After Erni $= \frac{4}{5} - \frac{4}{15}$

$\quad = \frac{8}{15}$.

Kwan Pin $= \frac{1}{4} \times \frac{8}{15}$ [M1].

$\quad = \frac{2}{15}$.

Zeti $= \frac{8}{15} - \frac{2}{15}$ [M1]

$\quad = \frac{6}{15}$

$\quad = \frac{2}{5}$

Ans: **(d)** _____$\frac{2}{5}$_____   [4] A1

13

3. (a) The marks scored by a class of 20 students in a Mathematics test are as follows:

49	46	69	61	49
50	45	62	57	69
68	60	49	59	57
68	45	55	46	50

Copy and complete the frequency table below. [2] B2

Marks (x)	Tally	Frequency
$45 \leq x < 50$	HHT. //	7.
$50 \leq x < 55$	//	2.
$55 \leq x < 60$	////	4.
$60 \leq x < 65$	///	3.
$65 \leq x < 70$	////	4.

※ Deduct one mark for every error.

(b) Mei Xuan conducted a survey among a group of students who travel to school either by bus or by car. She displayed the data collected with a pictogram shown below.

Bus

Car
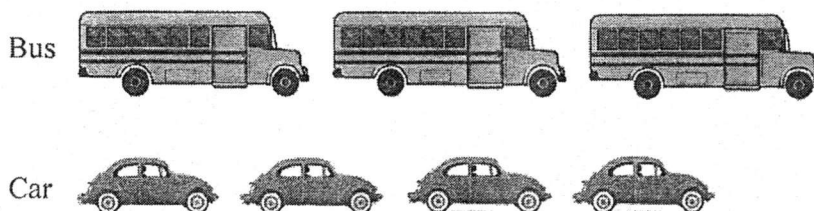
what is a possible misinterpretation of the above data and how would you modify the above pictogram to avoid ē misinterpretation?

It seems like there are more students taking bus. [B1]
Ans: I will make the bus and car to be of the same size [B1]

[2]

14

4. Mave drove for a distance of 135 km at a speed of x km/h and Charmaine drove for a distance of 120 km at a speed 10 km/h slower than Mave. Given that the **time taken** by the both of them are the **same**, find the speed each of them drove at.

Time taken by Mave = $\dfrac{135}{x}$

Time taken by Charmaine = $\dfrac{120}{x-10}$ $\Big\}$ [M1]

$$\dfrac{135}{x} = \dfrac{120}{x-10} \quad [M1]$$

$$\dfrac{135(x-10)}{x(x-10)} = \dfrac{120x}{x(x-10)} \quad \searrow \text{ either step can}$$
$$\nearrow \text{ get [M1]}$$

$135(x-10) = 120x$

$135x - 1350 = 120x$

$135x - 120x = 1350$

$15x = 1350$

$x = 90 \quad$ [A1]

$x - 10 = 90 - 10$
$\qquad = 80 \quad$ [A1]

Ans: **Mave:** _____90_____ km/h

Charmaine: _____80_____ km/h   [5]

15

5. The diagram below shows the first three of a sequence of dot patterns.

1st   2nd   3rd
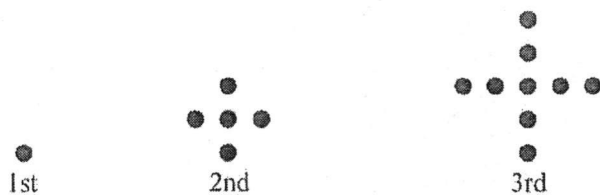
(a) The information from the sequence of dots is tabulated below.

Complete the table.   [1] B1

Pattern	Formula	Number of dots
1	1	1
2	$4 + 1$	5
3	$4 + 4 + 1$	9
4	$4 + 4 + 4 + 1$	13 .

(b) Write down a formula, T_n to calculate the number of dots in the nth pattern.

(c) Hence, find the number of dots in the 25th pattern.

(d) Find the value of m if there are 501 dots in the mth pattern.

(b) $T_2 = 4 \times 1 + 1$

$T_3 = 4 \times 2 + 1$

$T_4 = 4 \times 3 + 1$

$T_n = 4 \times (n-1) + 1$ [M1]

$= 4n - 4 + 1$

$= 4n - 3.$

(c) $T_{25} = 4(25) - 3$

$= 97.$

(d) $T_m = 4(m) - 3 .$

$501 = 4m - 3.$ [M1]
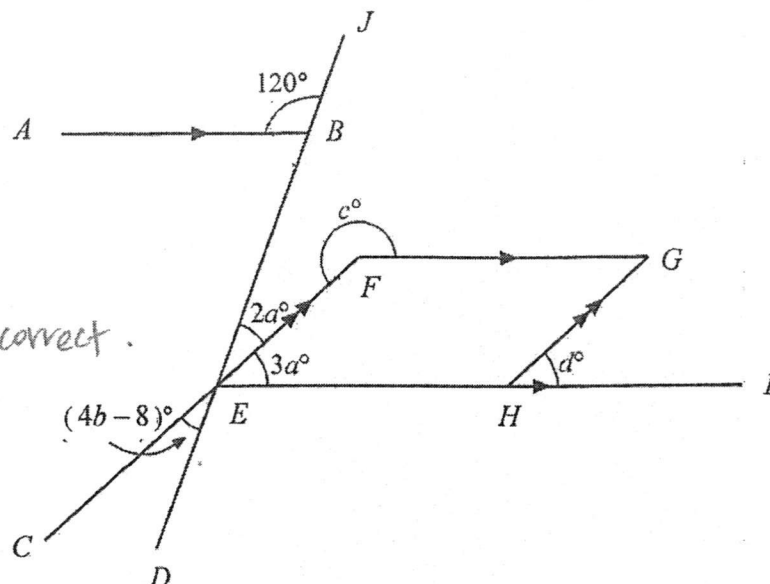
$4m = 501 + 3$

$= 504$

$m = 126.$

Ans: (b) $T_n =$ ___4n - 3 .___ [2] A1 / B2

(c) ___97___ dots [1] A1

(d) $m =$ ___126___ [2] A1

16

6. (a) Find the values of *a*, *b*, *c* and *d* in the figure below.

    (b) What type of angle is *c*°?

* MI and AI
awarded when
reasonings are correct.

(a) $\angle ABE = 180° - 120°$ (adj $\angle s$ on str. line) [MI] $d° = 3a°$ (corr $\angle s$, EF // HG)
$= 60°$ $= 3(12)°$
                                                                $= 36°$.

$2a° + 3a° = 60°$ (alt $\angle s$, AB // EI).
$5a° = 60°$
$a = 12$

Ans: (a) a = ___12.___ [2] AI

$4b - 8 = 2a$ (vert opp $\angle s$). [MI]   b = ___8.___ [2] AI
$4b - 8 = 2(12)$
$= 24$.   c = ___216___ [2] AI
$4b = 24 + 8$
$= 32$.   d = ___36___ [1] AI
$4b = 24 + 8$
$= 32$.
                                                  (b) ___Reflex.___ angle [1] BI
$b = 8$

$\angle EFG = 180° - 3a°$ (int $\angle s$, EH // FG) [MI]
$= 180° - 3(12)°$ 17
$= 144°$ $c° = 360° - 144°$ ($\angle s$ at a point)
                $= 216°$

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7. A solid prism whose cross section is a trapezium is moulded into a solid cylinder of radius 10 cm. All dimensions given in the diagram are in centimetres.

   (a) Find the height of the cylinder, giving your answer correct to 3 significant figures.

   (b) Find the total surface area of the cylinder, giving your answer correct to the nearest whole number.
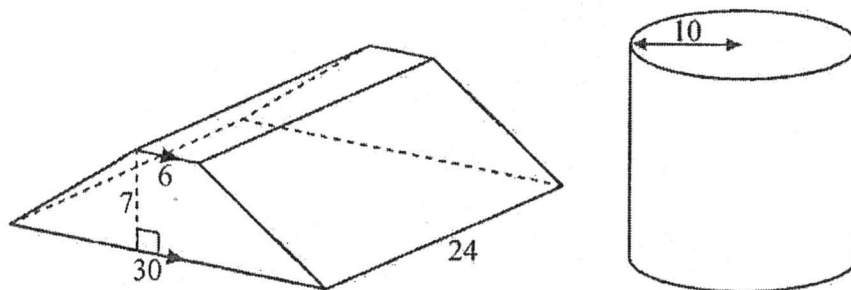
(a) Area of trapezium = $\frac{1}{2}(a+b)(h)$

$= \frac{1}{2}(6+30)(7)$ [M1]

$= 126 \text{ cm}^2$

Vol of prism = BA × Height

$= 126 \times 24$ [M1]

$= 3024 \text{ cm}^3$

Area of circle = $\pi(10)^2$

$= 314.16 \text{ cm}^2$

Vol of cylinder = BA × Height

$3024 = 314.16 \times H$ [M1]

$H = 9.6257$

$= 9.63 \text{ cm } (3sf)$

(b) Perimeter of base = $2\pi(10)$

$= 62.832$

[M1]

$SA = (62.832 \times 9.6257) + 2(314.16)$ [M1]

$= 1233.12$

$= 1233 \text{ cm}^2$

Ans: (a) ___9.63___ cm [4] A1

(b) ___1233___ cm² [3] A1

*ECF for height.

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8. The line graph below shows the change in body temperature of a patient from 8 am to 11 pm. The temperatures are taken every 3 hours. The normal temperature of a person is approximately $37°C$.

Patient's Body Temperature
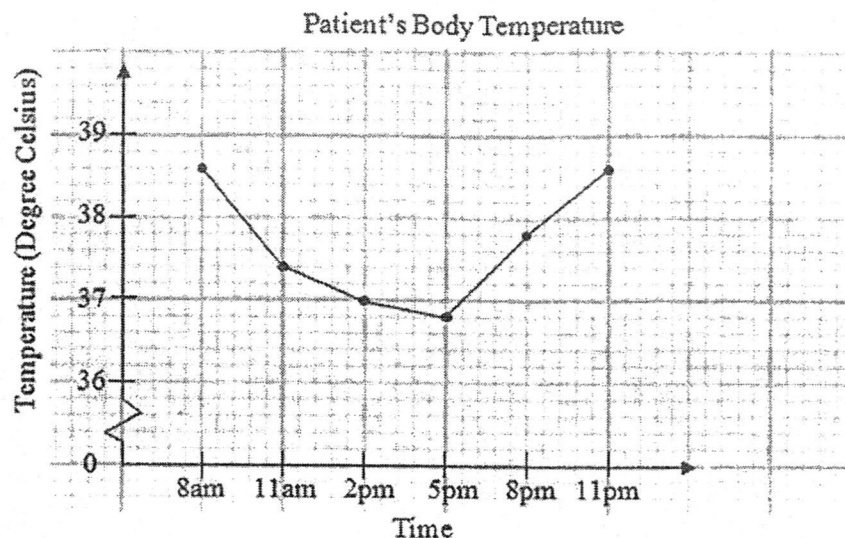
(a) State the time taken (in hours) for his temperature to decline till it reaches normal temperature.

(b) State a possible reason for the drop in the patient's temperature.

Ans: _He has taken medicine_ [1] B|

(d) Find the percentage increase in temperature from 5pm to 8pm.

(e) Do you think the patient has recovered by 11 pm? Explain your answer.
[B|] [B|]

Ans: _NO. His temperature went up to $38.6°C$._ [2]

(d) Percentage = $\frac{37.8 - 36.8}{36.8} \times 100\%$ [M|]
    Increase

= $\frac{1}{36.8} \times 100\%$

= 2.72% (3sf).

Ans: (a) ____6.____ hours [1| B|

(d) ____2.72____ % [2| A|

----------------------------END OF PAPER----------------------------

SETTER: Ms Chow CW

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