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Name: _____ Class _____ Index Number _____

OUTRAM SECONDARY SCHOOL
END-OF-YEAR EXAMINATION
2022

ESTD 1906

Subject : **Mathematics**

Paper No. : **1**

Level (Stream) : **Secondary One Express**

Date : **10 October 2022**

Duration : **1 hour**

Marks : **50**

READ THESE INSTRUCTIONS FIRST

Candidates answer on the Question Paper.

Write your name, class and index number on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
If working is needed for any question it must be shown with the answer.
Omission of essential working will result in loss of marks.
The use of an approved scientific calculator is expected, where appropriate.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use
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This document consists of **10** printed pages, including this cover page.

Setter: Chua Yi Ping

Answer **all** the questions.

1 **(a)** Consider the following numbers:

$$(-6)^2 \quad , \quad 19 \quad , \quad -\sqrt[3]{1000} \quad , \quad \pi \quad , \quad \frac{3}{7}$$

Identify and write down the

(i) negative integer,

Answer _____ [1]

(ii) irrational number.

Answer _____ [1]

(b) Arrange the following numbers in descending order:

$$\sqrt[3]{-343} \quad , \quad 5.4 \quad , \quad -3\frac{1}{2} \quad , \quad (-4)^3$$

Answer _____, _____, _____, _____ [2]

---

2 When written as the product of their prime factors,

p is $3^6 \times 5^3$,
q is $2^2 \times 3^3 \times 5$,
r is 2×3^2.

Find

(a) the value of the cube root of p,

Answer _____ [1]

(b) the HCF of p, q and r, giving your answer as the product of its prime factors.

Answer HCF = _____ [1]

---

3 **(a)** Express 9261 in terms of its prime factors.

Answer _____ [2]

(b) Explain why 9261 is a perfect cube.

Answer _____ [1]

---

4 Three bells chime every 12 minutes, 15 minutes, and 21 minutes respectively. Given that they chime together at 08 00, at what time will they next chime together again?

Answer _____ [2]

---

5 Given that $a = 4$, $b = -3$ and $c = 2$, evaluate $b^2 - 3c + 2a$. Show your substitution step clearly.

Answer ..... [2]

---

6 **(a)** Expand and simplify $4 + 5(3x - 2)$.

Answer ..... [1]

(b) Factorise $6ab - 2ac$.

Answer ..... [1]

---

7 Solve the following equations:

(a) $5x+3(4-x) = 8x$,

Answer $x =$ _____ [2]

(b) $\frac{7x+5}{3} = \frac{4x+3}{2}$.

Answer $x =$ _____ [2]

---

8 Express $\frac{3(x+2)}{4} - \frac{2(x-1)}{2}$ as a single fraction in its simplest form.

Answer _____ [3]

---

9 **(a)** Find the value of x such that $15 : 2x = 5 : 4$.

Answer $x =$ _____ [2]

(b) The lengths of a triangle XYZ are such that $XY : YZ : ZX = 2 : 3 : 3$. Given that $XY = 15$ cm, find the perimeter of triangle XYZ.

Answer _____ cm [2]

---

10 **(a)** Convert 65.5% to a fraction in its simplest form.

Answer _____ [1]

(b) Given that 35% of y is 175. Find the value of y.

Answer _____ [1]

(c) Jia Jun got 8 out of 10 marks in Test A, 56 out of 65 in Test B. Assuming Test A and Test B are of similar difficulty, which test did Jia Jun perform better? Justify your answer.

Answer Jia Jun did better in Test _____ because _____

_____ [2]

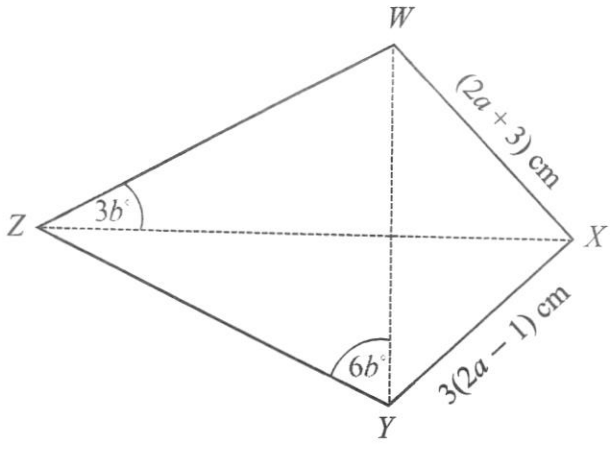
---

11 Jaden bought 120 handphones that cost $500 each. He sold 60% of them at $600 each and the remainder at a loss of 20%.

Did Jaden make a profit or a loss? Calculate the amount of profit / loss.

Answer Jaden made a _____ of $ _____ [4]

12 Figure $WXYZ$ is a kite.



Find the values of

(a) a,

Answer $a =$ _____ [2]

(b) b.

Answer _____ ° [2]

13 The following diagram shows part of a regular polygon.

How many sides does the polygon have?

Answer _____ sides [2]

---

14 The nth term of a sequence is given by $T_n = 2n+3$.

(a) Use the formula to find T_2 and T_8.

Answer $T_2 =$ _____

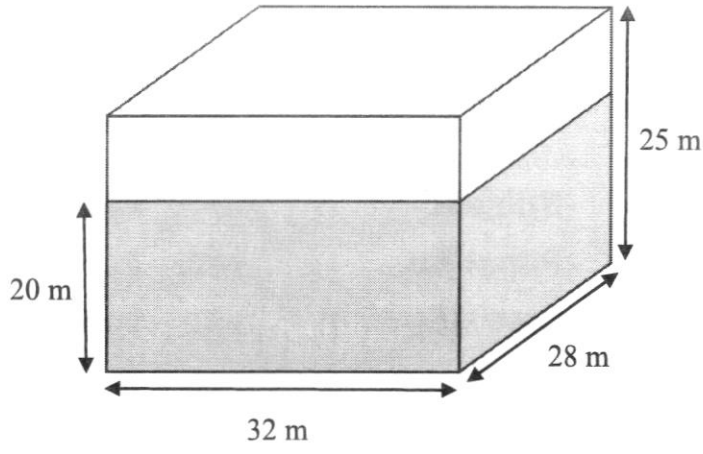
$T_8 =$ _____ [2]

(b) Is '28' a term in this sequence? Show your working and give a reason to support your answer.

Answer _____ [2]

---

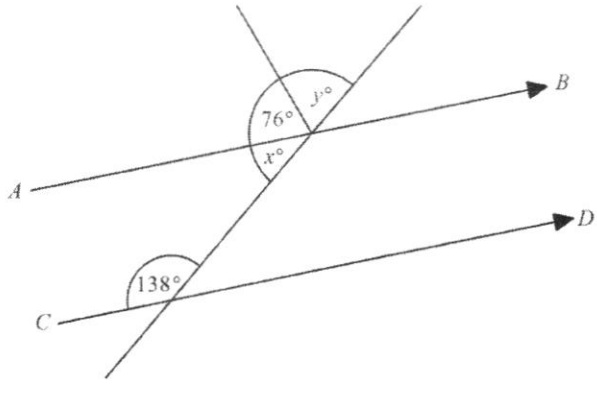
15 The following diagram shows a rectangular tank containing some water. Find the surface area of the tank that is in contact with the water.



Answer _____ m^2 [2]

---

16 In the following diagram, *AB* // *CD*.



By stating your reasons clearly, find the values of

(a) x,

Answer $x =$ _____ ° [2]

(b) y.

Answer $y =$ _____ ° [2]

Name: _____ Class | Index Number

ESTD 1906

OUTRAM SECONDARY SCHOOL
END-OF-YEAR EXAMINATION
2022

Subject : **Mathematics**

Paper No. : **2**

Level (Stream) : **Secondary One Express**

Date : **13 October 2022**

Duration : **1 hour 30 minutes**

Marks : **50**

READ THESE INSTRUCTIONS FIRST

Candidates answer on the Question Paper.

Write your name, class and index number on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
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Answer **all** questions.
If working is needed for any question it must be shown with the answer.
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For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use
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This document consists of 11 printed pages, including this cover page.

Setter: Mr Jeremy Lum

Answer **all** the questions.

1 Mrs Tan is 5 times as old as her daughter now. In 3 years' time, the sum of their ages will be 48 years.

If her daughter is x years old now,

(a) what is Mrs Tan's age in 3 years' time in terms of x?

Answer ..... [1]

(b) how old is Mrs Tan now?

Answer ..... [2]

2 Expand and simplify $3(x+2y)-4(y-x)$.

Answer ..... [2]

3 Solve $\frac{2(1-3r)}{3}+\frac{3r+5}{2}=3$.

Answer $r =$ ..... [3]

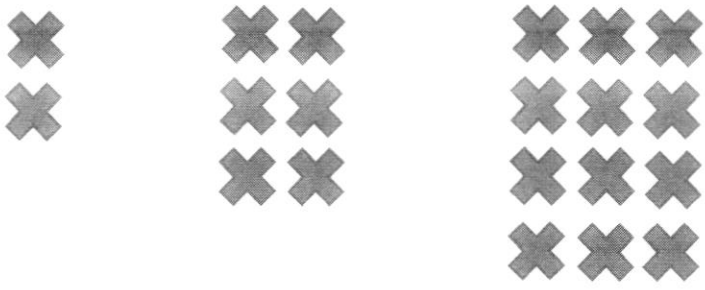
4 **(a)** Without using a calculator, estimate the value of $\frac{13.4\times4.8}{5.49}$ by rounding off each number in the expression to 1 significant figure.

Answer ..... [2]

(b) Using a calculator, work out the value of $\sqrt{\frac{10.5\times7.89}{3.46^3}}$. Leave your answer to 2 decimal places.

Answer ..... [1]

5 The diagram shows a sequence of patterns.



Pattern 1 Pattern 2 Pattern 3

(a) Find the number of crosses in Pattern 4.

Answer ..... [1]

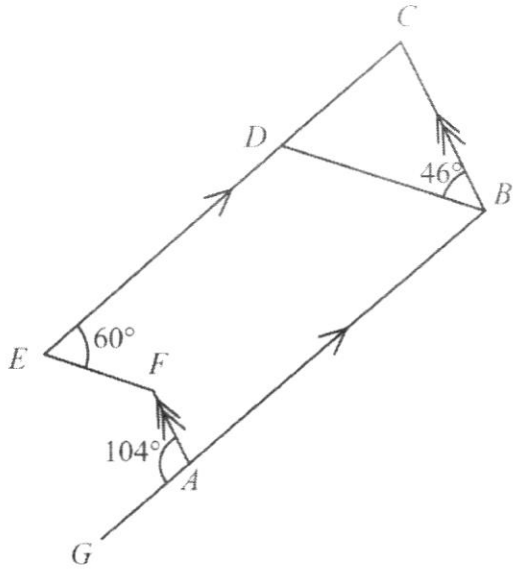
(b) Find an expression, in terms of n, for the total number of crosses in the n^{th} figure.

Answer ..... [1]

(c) Which figure has 11130 crosses?

Answer ..... [1]

6 In the figure, EC // GB, AF // BC, angle $CEF = 60°$, angle $GAF = 104°$ and angle $CBD = 46°$.



Find

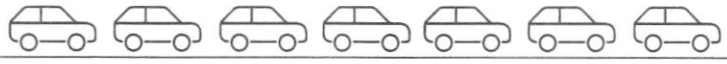
(a) angle CDB,

Answer ..... [2]

(b) reflex angle EFA.

Answer ..... [3]

7 The pictogram represents the number of cars in a town across the years.

Year	Number of cars
2018	
2019	
2020	
2021	

 represents 6000 cars

(a) Find the number of cars in the town in 2020.

Answer ..... [1]

(b) Calculate the percentage decrease in the number of cars in the town between 2018 and 2021.

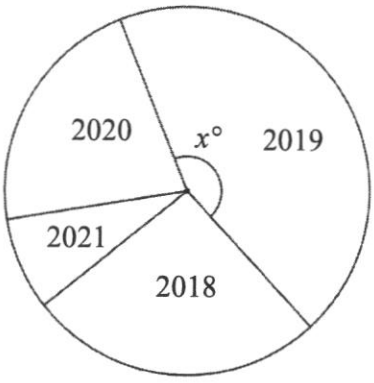
Answer .....% [2]

(c) What is one disadvantage of representing the above data using a pictogram?

.....

..... [1]

(d) The above data can also be represented using a pie chart. Calculate the angle that represents the number of cars in the town in 2019.

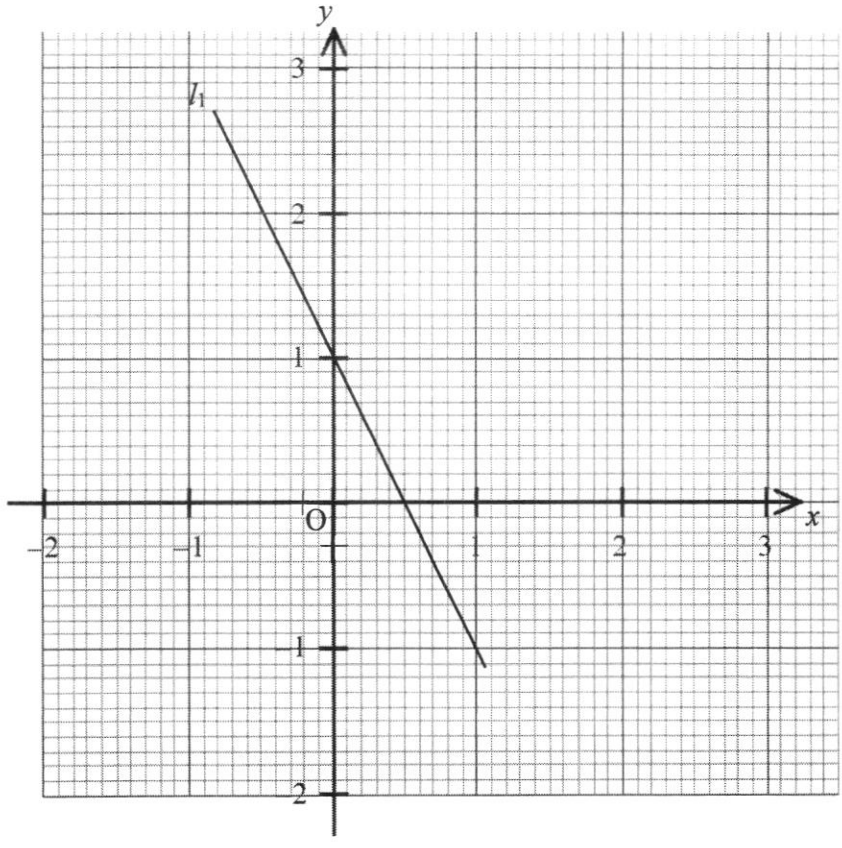


Answer $x =$ ..... [2]

8 A car travels the first 48 km of its journey at an average speed of 96 km/h. The car took 20 minutes to complete the remaining 15 km of its journey. Find the average speed of the car for its entire journey in km/h.

Answer .....km/h [3]

9 The diagram shows a straight line l_1.

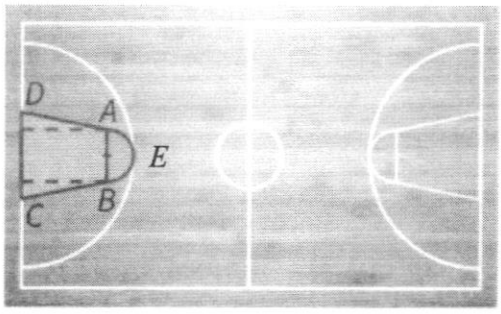


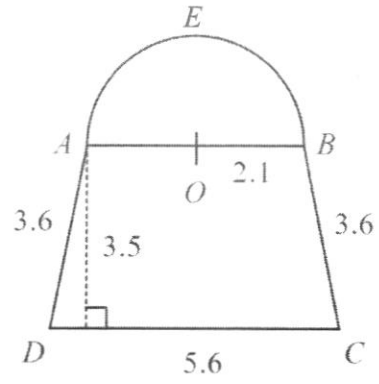
(a) Find the equation of the straight line.

Answer ..... [2]

(b) On the graph above, draw the line $x = 2$. [1]

10 A basketball court is shown. Region *EADCB* needs to be painted. This region can be modelled with a composite figure that is made up of a semicircle of radius 2.1 m, with centre *O*, and a trapezium *ABCD*. All lengths are measured in metres.





(a) Find the

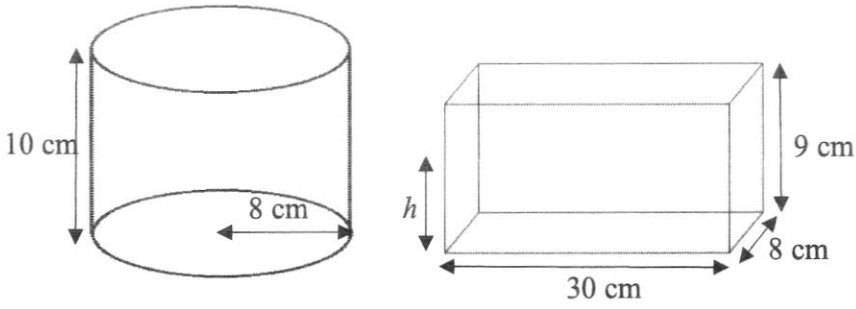
(i) area of region *EADCB*,

Answer .....m² [3]

(ii) perimeter of region *EADCB*.

Answer .....m [3]

11 Bella fills a cylinder completely with water. She then transfers all the water into a cuboid and the water level reaches a height, h cm.



Find

(a) the volume of the cylinder, leaving your answer to 2 decimal place,

Answer .....cm^3 [2]

(b) the value of h,

Answer .....cm [2]

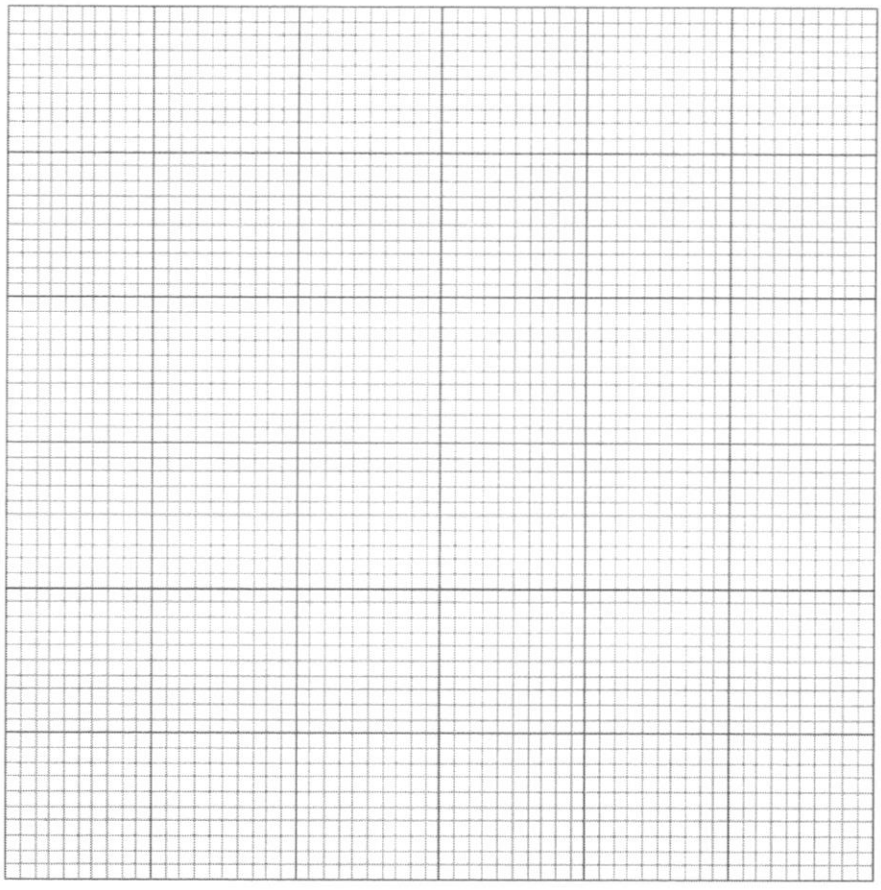
(c) the total surface area of the cuboid,

Answer .....cm^2 [2]

12 Tammy pours out water from a jug into cups of equal volume. She fills each cup completely and records the volume of water remaining in the jug (V ml) after x cups of water are filled.

x	0	5	10	15	20
V	5000	4100	3200	2300	1400

(a) Taking 2 cm to represent 5 units on the horizontal x-axis for $0 \leq x \leq 30$ and 2 cm to represent 1000 units on the vertical V-axis for $0 \leq V \leq 5000$, plot the points from the table and join them with a straight line. [3]



(b) Find the gradient of the line.

Answer ..... [1]

(c) What is the volume of each cup?

Answer .....ml [1]

(d) From your graph, find the

(i) volume of water remaining in the jug after Tammy fills 16 cups,

Answer .....ml [1]

(ii) maximum number of full cups of water the jug can fill.

Answer ..... [1]

End of Paper

Name: _____ Class _____ Index Number _____

OUTRAM SECONDARY SCHOOL
END-OF-YEAR EXAMINATION
2022

Subject	:	**Mathematics**
Paper No.	:	**2**
Level (Stream)	:	**Secondary One Express**
Date	:	**13 October 2022**
Duration	:	**1 hour 30 minutes**
Marks	:	**50**

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For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

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This document consists of **10** printed pages, including this cover page.

Setter: Chua Yi Ping

Answer **all** the questions.

1 **(a)** Consider the following numbers:

$$(-6)^2 \quad , \quad 19 \quad , \quad -\sqrt[3]{1000} \quad , \quad \pi \quad , \quad \frac{3}{7}$$

Identify and write down the

(i) negative integer,

Answer $-\sqrt[3]{1000}$ [1]

(ii) irrational number.

Answer π [1]

(b) Arrange the following numbers in descending order

$$\sqrt[3]{-343} \quad , \quad 5.4 \quad , \quad -3\frac{1}{2} \quad , \quad (-4)^3$$

Answer 5.4 -35 $\sqrt[3]{-343}$ $(-4)^3$ [2]

---

2 When written as the product of their prime factors,

p is $3^6 \times 5^3$,
q is $2^2 \times 3^3 \times 5$,
r is 2×3^2.

Find

(a) the value of the cube root of p,

Answer 45 [1]

(b) the HCF of p, q and r, giving your answer as the product of its prime factors.

Answer HCF = 3^2 [1]

---

3 **(a)** Express 9261 in terms of its prime factors.

3 | 9261
3 | 3087
3 | 1029
7 | 343
7 | 49
1 | 7

Answer $\times 7^3$ [2]

(b) Explain why 9261 is a perfect cube.

Answer The powers of the prime factors are multiples of 3. [1]

---

4 Three bells chime every 12 minutes, 15 minutes, and 21 minutes respectively. Given that they chime together at 08 00, at what time will they next chime together again?

3 | 12 15, 21
4, 5, 7

LCM of 12, 15, 21
= 3 × 4 × 5 × 7
= 420 mins
= 7 hours.

Answer 1500 / 3pm. [2]

---

5 Given that $a = 4$, $b = -3$ and $c = 2$, evaluate $b^2 - 3c + 2a$. Show your substitution step clearly.

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

$= 9 - 6 + 8$

$= 11$

Answer 11 [2]

---

6 **(a)** Expand and simplify $4 + 5(3x - 2)$

$4 + 15x - 10$

$15x - 6$

Answer $15x - 6$ [1]

(b) Factorise $6ab - 2ac$.

$2a(3b - c)$

Answer $2a(3b - c)$ [1]

---

7 Solve the following equations:

(a) $5x+3(4-x) = 8x$,

$5x + 12 - 3x = 8x$

$12 = 8x + 3x - 5x$

$12 = 6x$

$2 = x$

Answer $x = 2$ [2]

(b) $\frac{7x+5}{3} = \frac{4x+3}{2}$.

$2(7x+5) = 3(4x+3)$

$14x + 10 = 12x + 9$

$2x = -1$

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

Answer $x = -\frac{1}{2}$ [2]

---

8 Express $\frac{3(x+2)}{4} - \frac{2(x-1)}{2}$ as a single fraction in its simplest form.

$\frac{3(x+2) - 4(x-1)}{4}$

$= \frac{3x+6-4x+4}{4}$

$= \frac{-x+10}{4}$

Answer $\frac{-x+10}{4}$ [3]

---

9 **(a)** Find the value of x such that $15 : 2x = 5 : 4$.

$15 \div 2x = 15 \div 12$ (M1)

$2x = 12$

$x = 6$ (A1)

Answer $x =$ 6 [2]

(b) The lengths of a triangle XYZ are such that $XY : YZ : ZX = 2 : 3 : 3$. Given that $XY = 15$ cm, find the perimeter of triangle XYZ.

2 units → 15 cm

8 units → 15 × 4

2 + 3 + 3 = 8 units. (M1)

60 cm

Answer 60 cm [2]

---

10 (a) Convert 65.5% to a fraction in its simplest form.

$\frac{131}{200}$

Answer [1]

(b) Given that 35% of y is 175. Find the value of y.

$\frac{100}{35} \times 175$

Answer 500 [1]

(c) Jia Jun got 8 out of 10 marks in Test A, 56 out of 65 in Test B. Assuming Test A and Test B are of similar difficulty, which test did Jia Jun perform better? Justify your answer.

Test A → $\frac{8}{10} \times 100\% = 80\%$

Test B → $\frac{56}{65} \times 100\% = 86.2\%$

} Any 1 right, M1

Answer Jia Jun did better in Test B because the percentage for Test B is higher than that of test A. [2]

---

11 Jaden bought 120 handphones that cost $500 each. He sold 60% of them at $600 each and the remainder at a loss of 20%.

Did Jaden make a profit or a loss? Calculate the amount of profit / loss.

60% × 120 = 72

72 × 600 = $43 200

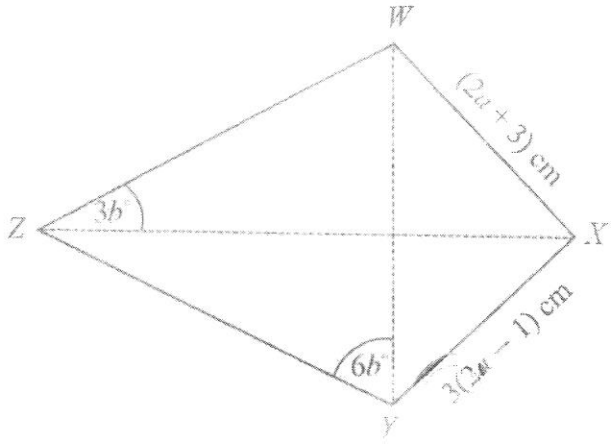
Amt. sold for remaining phones = 80% × 500
= $400 each

Remaining phones = 120 − 72
= 48

Amt. of profit/loss = [(48 × 400) + 43200] − (120 × 500)
= $2400 (profit)

Answer Jaden made a profit of $ 2400 [4]

12 Figure $WXYZ$ is a kite.



Find the values of

(a) a,

$(2a+3) = 3(2a-1)$

$2a + 3 = 6a - 3$

$6 = 4a$

$1.5 = a$

Answer $a = 1.5$ [2]

(b) b.

$3b + 6b + 90 = 180$ (diagonals of kite bisects at 90°)

$9b + 90 = 180$

$9b = 90$

$b = 10$

Answer 10 ° [2]

13 The following diagram shows part of a regular polygon.

How many sides does the polygon have?

ext. $\angle = 180 - 156$ (adj. $\angle$s on a str line)

$= 24°$

$\text{Sides} = \frac{360}{24}$

$= 15$ sides

Answers 15 sides [2]

14 The nth term of a sequence is given by $T = 2n + 3$

(a) Use the formula to find T_2 and T_8.

$T_2 = 2(2) + 3$

$= 7$

$T_8 = 2(8) + 3$

$= 19$

Answer $T_2 =$ 7

$T_8 =$ 19 [2]

(b) Is '28' a term in this sequence? Show your working and give a reason to support your answer.

$28 = 2n + 3$

$25 = 2n$

$12.5 = n$

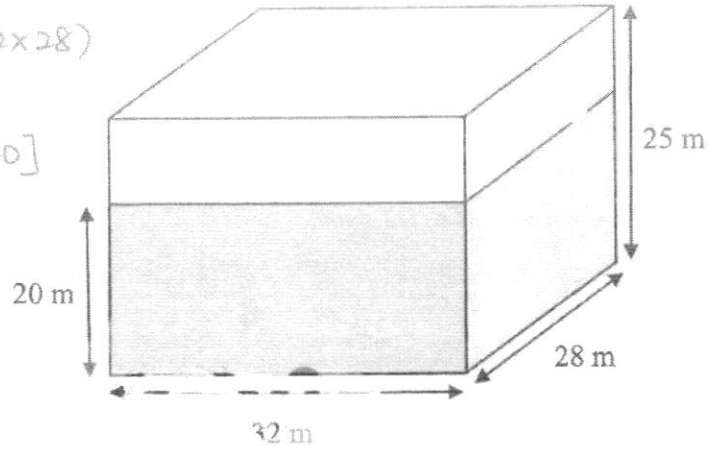
Answer '28' is not a term in the sequence because n is not an integer. [2]

15 The following diagram shows a rectangular tank containing some water. Find the surface area of the tank that is in contact with the water.

Surface area = Perimeter × 20 + (32×28)

= [(32+28+32+28) × 20]
+ (32×28)

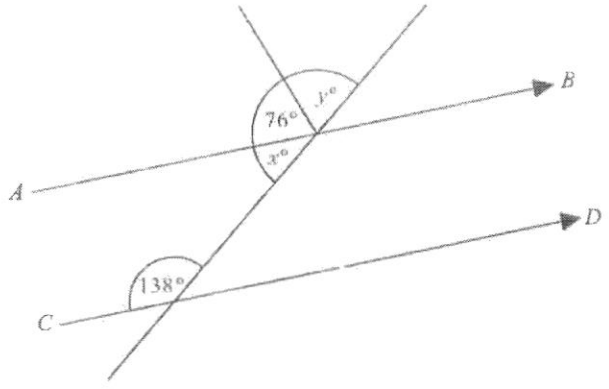
= 3296 m^2



Answer 3296 m^2 [2]

---

16 In the following diagram, $AB \parallel CD$.



Find the values of

(a) x, 180 − 138
= 42°

Answer x = 42 ° [1]

(b) y. 180 − 42 − 76
= 62°

Answer y = 62 ° [1]

End of Paper

S1E EOY P2 2022 Marking Scheme

1a	$5x+3$	B1
1b	$5x+3+x+3=48$ $6x=42$ $x=7$	M1 A1
2	$3(x+2y)-4(y-x)$ $=3x+6y-4y+4x$ $=7x+2y$	M1 A1
3	$\frac{2(1-3r)}{3}+\frac{3r+5}{2}=3$ $\frac{4-12r}{6}+\frac{9r+15}{6}=3$ $\frac{-3r+19}{6}=3$ $-3r+19=18$ $-3r=-1$ $r=\frac{1}{3}$	M1 M1 A1
4a	$\frac{13.4\times 4.8}{5.49}$ $=\frac{10\times 5}{5}$ $=10$	M1 A1
4b	$\sqrt{\frac{10.5\times 7.89}{3.46^3}}=1.41$	B1
5a	20	B1
5b	$n(n+1)$	B1
5c	Figure 105	B1
6a	$\angle DBA=104-46$ $=58°(corr\angle s)$ $\angle CDB=58°(alt\angle s)$	M1 A1
6b	$\angle EFA=60+76$ $=136°(alt\angle s;\text{int}\angle s)$ $reflex\angle EFA=360-136$ $=224°(\angle s\ at\ a\ pt)$	M1 M1 A1
7a	$3.5\times 6000=21000$	B1
7b	$\frac{12000}{24000}\times 100\%$ $=50\%$	M1 A1
7c	It is difficult to represent values using partial icons.	B1

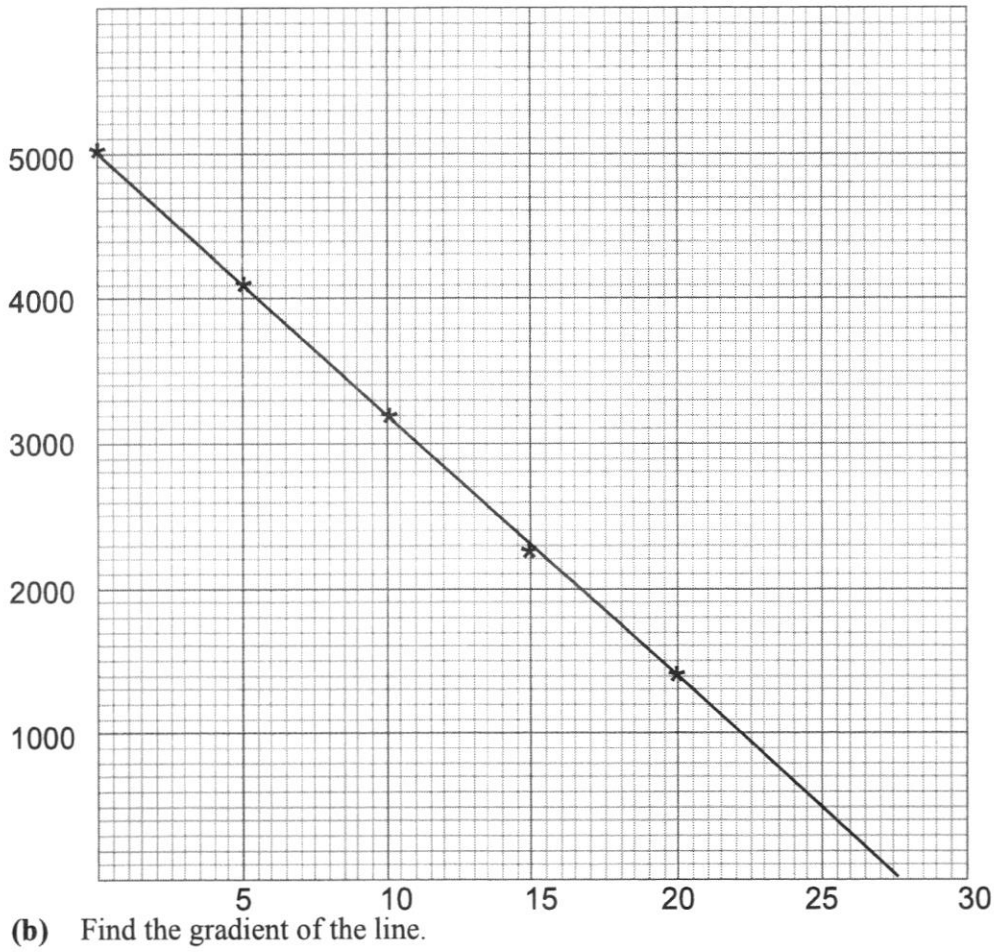
7d	$\frac{?}{16.5}\times 360$ $=42.4°$	M1 A1
8	Totaldistance $=48+15$ $=63\text{km}$ Time taken for first part of journey $\frac{48\text{ km}}{96\text{ km/h}}$ $=0.5\text{h}$ Total time $=\frac{1}{2}+\frac{1}{3}$ $=\frac{5}{6}\text{h}$ Average speed $=\frac{63\text{km}}{\frac{5}{6}\text{h}}$ $=75.6\text{km/h}$	M1 M1 A1
9a	$y=-2x+1$	B1 each
9b	Draw $x=2$	B1
10ai	Area of semicircle $=\frac{\pi(2.1)^2}{2}$ Area of trapezium $=\frac{1}{2}(3.5)(4.2+5.6)$ Area of figure $=\frac{\pi(2.1)^2}{2}+\frac{1}{2}(3.5)(4.2+5.6)$ $=13.85+17.15$ $=31.0\text{m}^2\text{(3s.f)}$	M1 M1 A1
10aii	Circumference of semicircle $=\frac{2\pi(2.1)}{2}$ Perimeter of figure $=\frac{2\pi(2.1)}{2}+3.6+5.6+3.6$ $=19.4\text{m}$	M1 M1 A1
11a	Volume of cylinder $=\pi(8)^2(10)$ $=2010.62\text{cm}^3$	M1 A1
11b	$2010.62\div(30\times 8)$ $=8.38\text{ cm (3s.f)}$	M1 A1
11c	*Total surface area* $=(2\times 30\times 8)+(30+30+8+8)\times 9$ $=1164\text{cm}^2$	M1 A1
12a	Correct axes – 1m Correctly plotted points – 1m Correct line drawn through plotted points – 1m	M1 M1 M1

12bi	180	B1
12c	180ml	A1
12di	2100ml	B1
12dii	27 (round down from 27.5)	B1

12 Tammy pours out water from a jug into cups of equal volume. She fills each cup completely and records the volume of water remaining in the jug (V ml) after x cups of water are filled.

x	0	5	10	15	20
V	5000	4100	3200	2300	1400

(a) Taking 2 cm to represent 5 units on the horizontal x-axis for $0 \leq x \leq 30$ and 2 cm to represent 1000 units on the vertical V-axis for $0 \leq V \leq 5000$, plot the points from the table and join them with a straight line.



(b) Find the gradient of the line.

Answer .....

(c) What is the volume of each cup?