



Student Name:

Teacher's Initials:

Staff involved:

PJR JAI
BHC SJB
ARP LMD
JZT PDJ
ALY PCB*
ARM/AYH

YEAR 9

Friday 11th November 2022

5.3 MATHEMATICS

250 copies

Total time: 90 minutes

INSTRUCTIONS TO STUDENTS:

- * Write your FULL name and teacher's initials on this page
- * Answer ALL questions in the spaces provided
- * Show ALL necessary working
- * Marks may not be awarded for careless or badly arranged work
- * Diagrams are NOT drawn to scale

This examination consists of TWO sections.

SECTION 1 : NON-CALCULATOR

(20 minutes)

Calculators must NOT be used in this section.

SECTION 2 : CALCULATOR

(70 minutes)

Calculators MAY be used in this section.

* * * *

Section	Marks	Your Mark
Section 1	25	
Section 2	93	
Total	118	

Section 1: Non-Calculator (25 Marks)

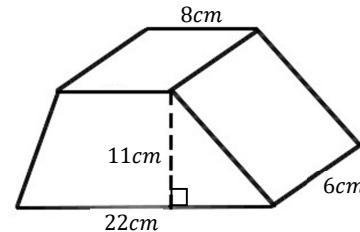
Question 1
Simplify $\sqrt{77} \div \sqrt{11}$

1

Question 2
Simplify $8x^{17} \times 9x^{38}$

2

Question 3
Find the volume of the trapezoidal prism.



3

Question 4

Evaluate $36^{\frac{3}{2}}$

1

Question 5

A biased 6-sided die is rolled 9 times and on 7 occasions it landed on a four. Based on these results, if the die is rolled 81 times, how many times would you expect it to land on a four?

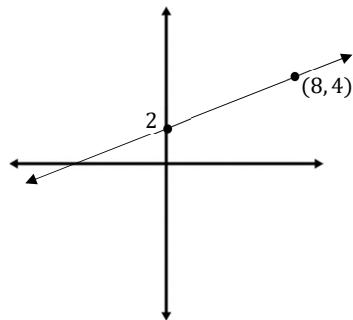
2

Question 6

Solve:

a) $7 + 5x = 11 - 3x$

b) $\frac{3x}{4} - \frac{2x+1}{7} = 2$

Question 7

- i) Find the gradient of the line.

1

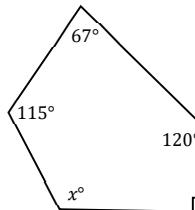
- ii) Find the equation of the line.

1

- iii) Find the coordinates of the x -intercept.

2

2

Question 8Find the value of x , giving reasons.

3

3

1

4

Question 9

It is given that:

- $A = (2x + 10)(3x - 6)$
- $B = 2x^2 + 2x - 12$
- $C = 3(x^2 + 8x + 15)$

Find $\frac{\sqrt{A}}{\sqrt{B}} \times \sqrt{C}$, in simplified form.

End of Section 1



Student Name:

Teacher's Initials:

YEAR 9

Friday 11th November 2022

5.3 MATHEMATICS

250 copies

Time: 70 minutes

SECTION 2: CALCULATOR

INSTRUCTIONS TO STUDENTS:

- * Write your FULL name and teacher's initials on this page
- * Answer ALL questions in the spaces provided
- * Show ALL necessary working
- * Approved calculators MAY be used
- * Marks may not be awarded for careless or badly arranged work
- * Diagrams are NOT drawn to scale

* * * *

There are TEN parts to this section.

Part	Topic	Marks	Your Mark
A	Algebra, Indices and Surds	11	
B	Products and Factors	12	
C	Equations	11	
D	Earning Money	10	
E	Trigonometry	9	
F	Surface Area and Volume	8	
G	Angles, Congruence and Similarity	7	
H	Probability	6	
I	Coordinate Geometry and Graphs	8	
J	Mixed Questions	11	
Total		93	

Part A: Algebra, Indices and Surds (11 Marks)

Question 1

Round 13.0491 to 4 significant figures.

1

Question 2

Write the following in scientific notation:

a) 453 000 000

1

b) 0.0072

1

Question 3

Simplify, leaving your answer with positive indices:

a) $(-2m^4)^5$

2

b) $\left(\frac{3}{x^{-2}}\right)^{-3}$

2

Question 4

Simplify:

a) $7\sqrt{5} \times 4\sqrt{13}$

1

b) $\sqrt{6} - 2\sqrt{5} + 3\sqrt{24} + \sqrt{500}$

3

Part B: Product and Factors (12 Marks)**Question 5**

Expand and simplify:

a) $(p + 8)(p + 2)$

Student name:.....

Teacher's Initials:

1

Part C: Equations (11 Marks)**Question 8**

Solve:

a) $-8(4y + 3) = 11y$

2

b) $(2y - 3)^2$

2

b) $x^2 - 9 = 16$

2

Question 6

Factorise:

a) $x^2 - x - 42$

2

Question 9:Make a the subject:

a) $v = u + at$

1

b) $6a^2 + 11a + 3$

2

b) $z = \frac{\sqrt{c-a}}{b}$

3

c) $3k^3 - 48k$

2

Question 10:

The width of a rectangle is 5cm more than half the length. The perimeter is 94cm.

i) Draw a diagram with this information.

1

Question 7Simplify $\frac{a^2+7a+10}{ax+5x+2a+10}$

3

ii) By forming and solving an equation, find the length of the rectangle.

2

Part D: Earning Money (10 Marks)**Question 11**

Joe has a salary of \$82 500 p.a. Calculate his weekly pay.

Student name:.....

Teacher's Initials:

1

Question 12

Kiran works as a chef and earns \$5400 each month. Twice a year he receives an additional monthly bonus of 3% of his monthly salary.

i) Find Kiran's annual salary.

2

ii) The table below indicates the tax rates. Find the amount of tax that Kiran pays in the year.

2

Taxable income	Tax on this income
0 – \$18,200	Nil
\$18,201 – \$45,000	19 cents for each \$1 over \$18,200
\$45,001 – \$120,000	\$5,092 plus 32.5 cents for each \$1 over \$45,000
\$120,001 – \$180,000	\$29,467 plus 37 cents for each \$1 over \$120,000
\$180,001 and over	\$51,667 plus 45 cents for each \$1 over \$180,000

Question 13

Amy earns a wage. Last week she was paid \$863.85 for working a total of 32 hours.

Five of those hours paid double-time and 4 hours paid time-and-a-half.

What was Amy's normal hourly rate of pay?

2

Question 14

Charlotte invests \$3200 into an account for 5 years and earns simple interest at 8% p.a.

i) Calculate the interest.

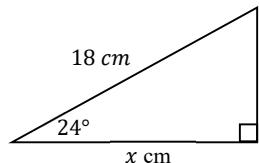
1

ii) How many years will it take for her investment to double?

2

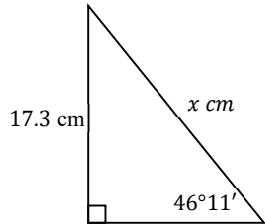
Part E: Trigonometry (9 Marks)**Question 15**

- a) Find the value of x , to 2 decimal places.



2

- b) Find the value of x to 1 decimal place.



2

Question 16:

William is going for a run.

He runs north for 8km and then west for 5.1km.

- i) How far is he from the start? Answer to 1 decimal place.

2

- ii) What is William's bearing from the start? Answer to the nearest minute.

2

- iii) How many more kilometres west does William need to run to be Northwest from the start?

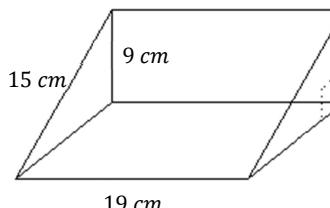
1

Student name:.....

Teacher's Initials:.....

Part F: Surface Area and Volume (8 Marks)**Question 17**

- Find the total surface area of this closed shape.



3

Question 18

A square based pyramid has a perpendicular height of 32 cm.

The side length of the base is 12cm.

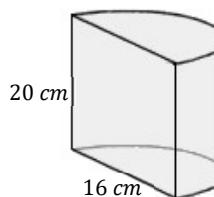
Calculate the volume.

2

Question 19

Find the surface area of the closed half cylinder, in exact form.

3



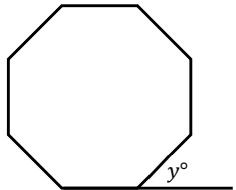
Part G: Angles, Congruence and Similarity (7 Marks)

Student name:.....

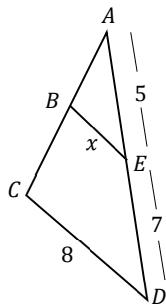
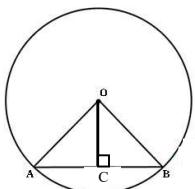
Teacher's Initials:

Find the value of y , the exterior angle of the regular octagon below.

1

**Question 21** $\triangle ABE$ is similar to $\triangle ACD$.Find the value of x

2

**Question 22**In the diagram below, O is the centre of the circle. OC is perpendicular to AB .i) Prove that $\triangle OAC \cong \triangle OBC$.

3

ii) Explain why OC bisects AB .

1

Part H: Probability (6 marks)**Question 23**

The letters of CRICKETER are each written on a card and placed in a bag.

A letter is drawn out at random.

i) Find $P(C)$.

1

ii) A card with the letter C is removed from the bag and **not** replaced.

A second card is then removed from the bag.

Find the probability that a C is shown on the second card.

2

Question 24

A group of males and females were asked whether they agree or disagree with the following statement.

"Male and female sports players should have equal pay."

The two-way table below indicates some of the results.

	Agree	Disagree	Total
Male	37	12	49
Female	28		
Total		21	

i) How many females were surveyed?

1

ii) A person is chosen at random.

What is the probability this person agreed that men and women should have equal pay in sport?

2

Part I: Coordinate Geometry and Graphs (8 Marks)

Student name:.....

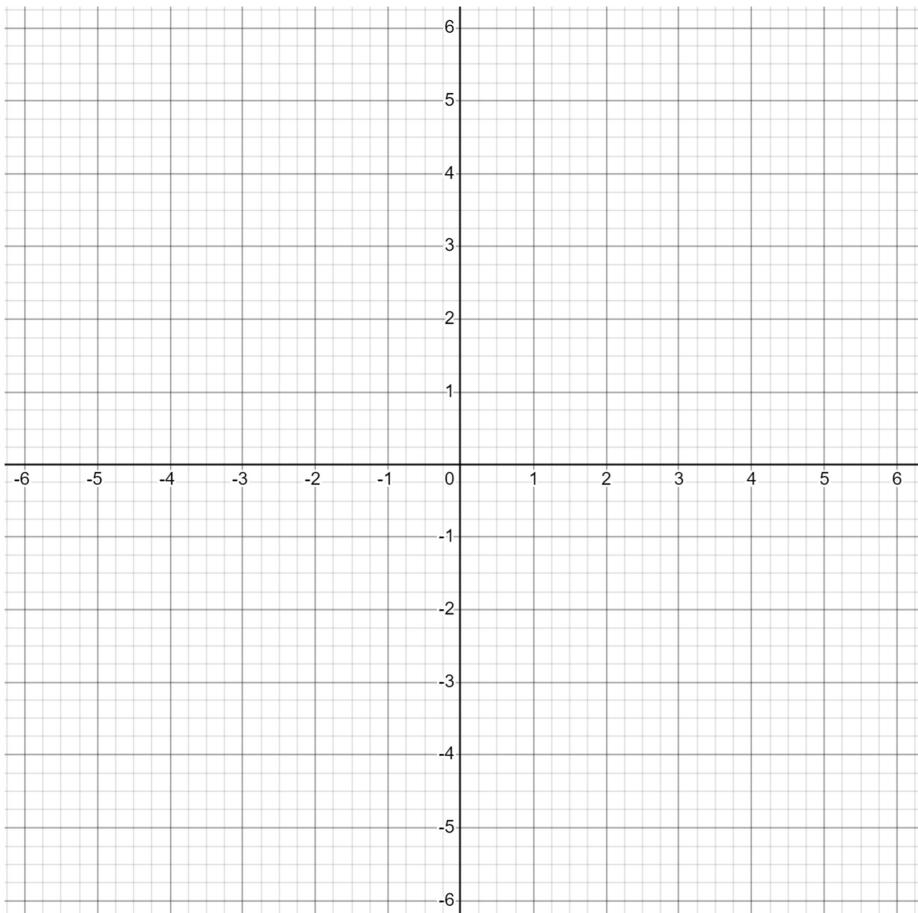
Teacher's Initials:.....

Question 25Find the distance between $(-3, 1)$ and $(7, 6)$ in simplified surd form.

2

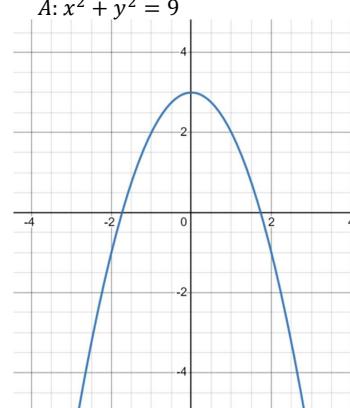
Question 26Sketch $y = \frac{3}{2}x - 3$, labelling two points.

2

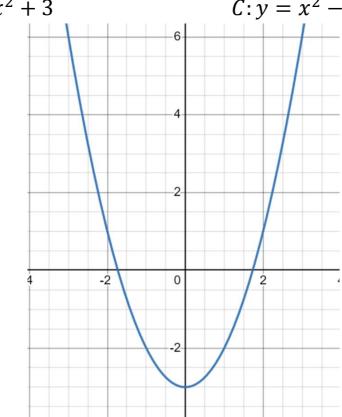
**Question 27**

Match the graph with the equation.

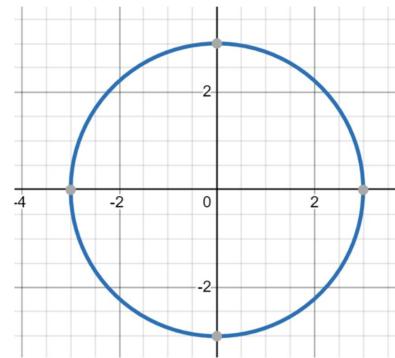
A: $x^2 + y^2 = 9$



B: $y = -x^2 + 3$



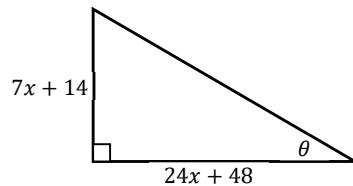
C: $y = x^2 - 3$

**Question 28**The coordinates of the midpoint of $(1, 5)$ and $(10, q)$ are $(m, -1)$.Find the values of q and m .

2

Part J: Mixed Questions (11 Marks)**Question 29**i) Find the value of θ to the nearest degree.Student name:
Teacher's Initials:.....

2

ii) Given that the hypotenuse has a length of 275cm, find x .

3

Question 30

Natalija is going on a journey in two stages.

The first stage takes $(x + 5)$ seconds with an average speed of $(2x - 1)m/s$.The second stage takes $(x - 1)$ seconds with an average speed of $(x - 3)m/s$.

Find an expression for the average speed for the entire journey.

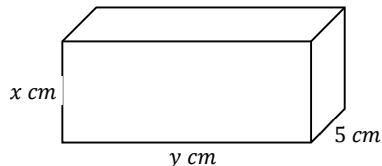
(Note: $\text{average speed} = \frac{\text{total distance}}{\text{total time}}$)

3

Question 31

The rectangular prism has a volume of 240 cm^3 and a surface area of 286 cm^2 .
Find x and y .

3



Section 1: Non-Calculator (25 Marks)

Question 1

Simplify $\sqrt{77} \div \sqrt{11}$

1

$$= \sqrt{\frac{77}{11}} = \sqrt{7} \quad \checkmark$$

Question 2

Simplify $8x^{17} \times 9x^{38}$

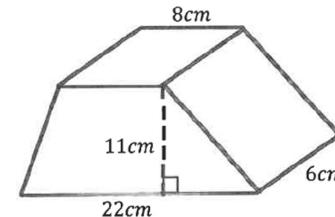
2

$$= \cancel{8} \times \cancel{x^{17}}^{55} \times \cancel{9} \times \cancel{x^{38}}^{55} \quad \checkmark$$

Question 3

Find the volume of the trapezoidal prism.

3



$$\begin{aligned} V &= A \times h \\ &= \frac{1}{2} \times 11 \times (22+8) \times 6 \\ &= \frac{1}{2} \times 11 \times 30 \times 6 \\ &= 990 \text{ cm}^3 \quad \checkmark \\ &\uparrow \\ &\text{units} \quad \checkmark \end{aligned}$$

Question 4

$$\begin{aligned} \text{Evaluate } 36^{\frac{3}{2}} &= (\sqrt{36})^3 \\ &= 6^3 \\ &= 216 \quad \checkmark \end{aligned}$$

1

Question 5

A biased 6-sided die is rolled 9 times and on 7 occasions it landed on a four.

2

Based on these results, if the die is rolled 81 times, how many times would you expect it to land on a four?

$$\begin{aligned} \frac{7}{9} \times 81 &= 7 \times 9 \\ &= 63 \text{ times} \quad \checkmark \end{aligned}$$

- 2 -

Question 6

Solve:

a) $7 + 5x = 11 - 3x$

$$8x = 4 \quad \checkmark$$

$$x = \frac{1}{2} \quad \checkmark$$

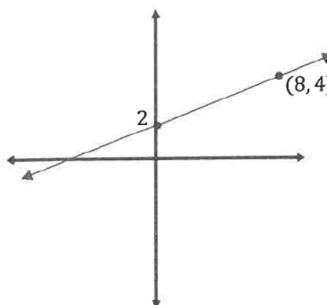
b) $\frac{3x}{4} - \frac{2x+1}{7} = 2$

$$7x - 4(2x+1) = 56 \quad \checkmark$$

$$21x - 8x - 4 = 56 \quad \checkmark$$

$$13x = 60$$

$$x = \frac{60}{13} \quad \checkmark$$

Question 7

i) Find the gradient of the line.

$$m = \frac{2}{8} = \frac{1}{4} \quad \checkmark$$

1

ii) Find the equation of the line.

$$y = \frac{1}{4}x + 2 \quad \checkmark$$

1

iii) Find the coordinates of the x -intercept.

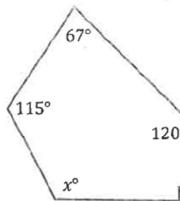
Solve $0 = \frac{1}{4}x + 2$

$$x = -8 \quad \checkmark$$

2

$$(-8, 0) \quad \checkmark \quad [\text{must have in brackets}]$$

2

Question 8Find the value of x , giving reasons.

$$x + 90 + 120 + 67 + 115 = 3 \times 180^\circ \quad \checkmark$$

(angle sum of a pentagon) \checkmark

$$x + 392 = 540$$

$$x = 148^\circ \quad \checkmark$$

3

Question 9

It is given that:

- $A = (2x+10)(3x-6)$
- $B = 2x^2 + 2x - 12$
- $C = 3(x^2 + 8x + 15)$

Find $\frac{\sqrt{A}}{\sqrt{B}} \times \sqrt{C}$, in simplified form.

$$\frac{\sqrt{(2x+10)(3x-6)}}{\sqrt{2x^2 + 2x - 12}} \times \sqrt{3(x^2 + 8x + 15)}$$

$$= \frac{\sqrt{6(x+5)(x-2)}}{\sqrt{2(x+3)(x-2)}} \quad \checkmark$$

$$= \sqrt{9(x+5)^2} \quad \checkmark$$

$$= 3(x+5) \quad \checkmark$$

3

4

Part A: Algebra, Indices and Surds (11 Marks)

Question 1

Round 13.0491 to 4 significant figures.

$$13.05 \quad \checkmark$$

Question 2

Write the following in scientific notation:

$$a) 453\,000\,000 \quad 4.53 \times 10^8 \quad \checkmark$$

$$b) 0.0072 \quad 7.2 \times 10^{-3} \quad \checkmark$$

Question 3

Simplify, leaving your answer with positive indices:

$$a) (-2m^4)^5 \quad -32m^{20} \quad \checkmark$$

$$b) \left(\frac{3}{x^{-2}}\right)^{-3} = (3x^2)^{-3} \quad = \frac{1}{27x^6} \quad \left(\frac{1}{27} \quad \text{and} \quad \frac{1}{x^6} \quad \checkmark \right)$$

Question 4

Simplify:

$$a) 7\sqrt{5} \times 4\sqrt{13} = 28\sqrt{65} \quad \checkmark$$

$$b) \sqrt{6} - 2\sqrt{5} + 3\sqrt{24} + \sqrt{500} \quad \checkmark \\ = \sqrt{6} - 2\sqrt{5} + 6\sqrt{6} + 10\sqrt{5} \\ = 7\sqrt{6} + 8\sqrt{5} \quad \checkmark$$

1

Part B: Product and Factors (12 Marks)

Student name:.....

Teacher's Initials:

Question 5

Expand and simplify:

$$a) (p+8)(p+2)$$

$$= p^2 + 10p + 16 \quad \checkmark$$

1

1

$$b) (2y-3)^2 \quad \checkmark \\ = 4y^2 - 12y + 9 \quad \checkmark$$

1

Question 6

Factorise:

$$a) x^2 - x - 42 \quad \checkmark \\ = (x-7)(x+6) \quad \checkmark$$

2

2

$$b) 6a^2 + 11a + 3 \quad \checkmark \\ = (3a+1)(2a+3) \quad \checkmark$$

2

1

$$c) 3k^3 - 48k \quad \checkmark \\ = 3k(k^2 - 16) \quad \checkmark \\ = 3k(k-4)(k+4) \quad \checkmark$$

3

$$\text{Question 7} \\ \text{Simplify } \frac{a^2+7a+10}{ax+5x+2a+10} = \frac{(a+5)(a+2)}{x(a+5)+2(a+5)} \quad \checkmark \text{ numerator}$$

3

3

$$= \frac{(a+5)(a+2)}{(a+5)(x+2)} \quad \checkmark \text{ denominator}$$

3

$$= \frac{a+2}{x+2} \quad \checkmark \text{ simplified}$$

-7-

Part C: Equations (11 Marks)

Question 8

Solve:

$$a) -8(4y + 3) = 11y$$

$$-32y - 24 = 11y \checkmark$$

$$-24 = 43y$$

$$y = \frac{-24}{43} \checkmark$$

2

$$b) x^2 - 9 = 16$$

$$x^2 = 25$$

$$x = \pm 5 \checkmark \checkmark$$

2

Question 9:

Make a the subject:

$$a) v = u + at$$

$$a = \frac{v-u}{t} \checkmark$$

1

$$b) z = \frac{\sqrt{c-a}}{b}$$

$$bz = \sqrt{c-a} \checkmark$$

$$b^2z^2 = c - a \checkmark$$

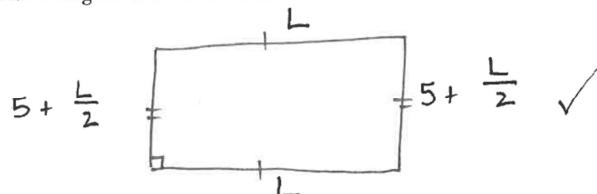
$$a = c - b^2z^2 \checkmark$$

3

Question 10:

The width of a rectangle is 5cm more than half the length. The perimeter is 94cm.

i) Draw a diagram with this information.



1

ii) By forming and solving an equation, find the length of the rectangle.

$$94 = 2L + 2\left(5 + \frac{L}{2}\right) \checkmark$$

2

$$94 = 3L + 10$$

$$3L = 84$$

$$L = 28 \text{ cm } \checkmark$$

Part D: Earning Money (10 Marks)

Question 11

Joe has a salary of \$82 500 p.a. Calculate his weekly pay.

Student name.....

Teacher's Initials:

1

$$\frac{\$82500}{52.18} = \$1581.06 \checkmark$$

OR

$$\frac{\$82500}{52} = \$1586.53 \checkmark$$

Question 12

Kiran works as a chef and earns \$5400 each month. Twice a year he receives an additional monthly bonus of 3% of his monthly salary.

i) Find Kiran's annual salary.

$$\begin{aligned} \text{Annual salary} &= 12 \times \$5400 + 2 \times 0.03 \times \$5400 \checkmark \\ &= \$64800 + \$324 \\ &= \$65124 \checkmark \end{aligned}$$

ii) The table below indicates the tax rates. Find the amount of tax that Kiran pays in the year.

Taxable income	Tax on this income
0 - \$16,200	N/A
\$16,201 - \$180,000	10 cents for each \$1 over \$16,200
→ \$16,201 - \$120,000	\$3,092 plus 30.5 cents for each \$1 over \$40,000
\$120,001 - \$180,000	\$29,467 plus 37 cents for each \$1 over \$120,000
\$180,001 and over	\$64,667 plus 45 cents for each \$1 over \$180,000

$$\begin{aligned} \text{Tax payable} &= \$5092 + 0.325 \times (65124 - 45000) \checkmark \\ &= \$5092 + \$6540.30 \\ &= \$11632.30 \checkmark \end{aligned}$$

Question 13

Amy earns a wage. Last week she was paid \$863.85 for working a total of 32 hours. Five of those hours paid double-time and 4 hours paid time-and-a-half.

What was Amy's normal hourly rate of pay?

Let normal hourly rate of pay be \$x/hour.

$$\text{Then } 5 \times 2x + 4 \times 1.5x + 23x = \$863.85 \checkmark$$

$$10x + 6x + 23x = \$863.85$$

$$39x = \$863.85$$

$$x = \$22.15 \checkmark$$

(OR guess and check method)

Question 14

Charlotte invests \$3200 into an account for 5 years and earns simple interest at 8% p.a.

i) Calculate the interest.

$$I = PRN$$

$$= \$3200 \times 0.08 \times 5$$

$$= \$1280 \quad \checkmark$$

ii) How many years will it take for her investment to double?

Solve $3200 = 3200 \times 0.08 \times N \checkmark$

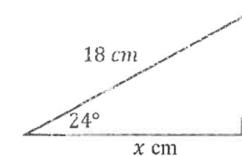
$$\frac{1}{0.08} = N$$

$$N = 12.5 \text{ years} \quad \checkmark$$

1

Part E: Trigonometry (9 Marks)**Question 15**

a) Find the value of x , to 2 decimal places.



$$\cos 24^\circ = \frac{x}{18} \quad \checkmark$$

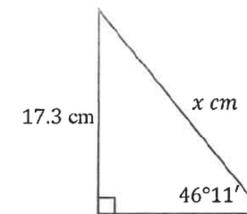
$$x = 18 \times \cos 24^\circ$$

$$x = 16.44 \text{ cm} \quad \checkmark$$

2

2

b) Find the value of x to 1 decimal place.



$$\sin 46^\circ 11' = \frac{17.3}{x} \quad \checkmark$$

$$x = \frac{17.3}{\sin 46^\circ 11'}$$

$$x = 24.0 \text{ cm} \quad \checkmark$$

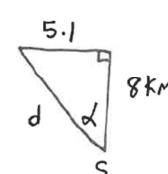
2

Question 16:

William is going for a run.

He runs north for 8km and then west for 5.1km.

i) How far is he from the start? Answer to 1 decimal place.



$$d^2 = 8^2 + 5.1^2 \quad \checkmark$$

$$d = \sqrt{90.01} \quad \checkmark$$

$$d = 9.5 \text{ km} \quad \checkmark$$

2

ii) What is William's bearing from the start? Answer to the nearest minute.

2

$$\tan \alpha = \frac{5.1}{8}$$

$$\alpha = 32^\circ 31' \quad \checkmark$$

Hence bearing is $\text{N} 32^\circ 31' \text{ W}$

$$360^\circ - 32^\circ 31'$$

$$= 327^\circ 29' \quad \checkmark$$

1

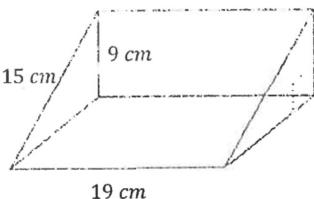
iii) How many more kilometres west does William need to run to be Northwest from the start?

$$2.9 \text{ km} \quad \checkmark$$

Part F: Surface Area and Volume (8 Marks)

Question 17

Find the total surface area of this closed shape.



$$\begin{aligned} S.A. &= (19 \times 12) + (9 \times 19) + (15 \times 19) + \\ &\quad 2 \times \left(\frac{1}{2} \times 12 \times 9 \right) \checkmark \\ &= 792 \text{ cm}^2 \checkmark \end{aligned}$$

Question 18

A square based pyramid has a perpendicular height of 32 cm.

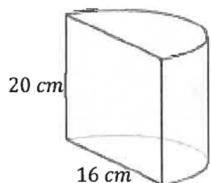
The side length of the base is 12cm.

Calculate the volume.

$$\begin{aligned} V &= \frac{1}{3} \times 12^2 \times 32 \checkmark \\ V &= 1536 \text{ cm}^3 \checkmark \quad (\text{don't need units mentioned}) \end{aligned}$$

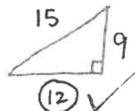
Question 19

Find the surface area of the closed half cylinder, in exact form.



$$\begin{aligned} S.A. &= (20 \times 16) + (\pi \times 8^2) + \frac{1}{2}(2\pi \times 8) \\ &= 320 + 64\pi + 8\pi \\ &= 320 + 72\pi \text{ cm}^2 \end{aligned}$$

- 12 -

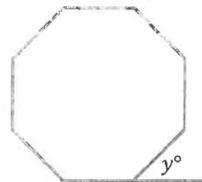


3

Part G: Angles, Congruence and Similarity (7 Marks) Student name..... Teacher's initial.....

Question 20

Find the value of y , the exterior angle of the regular octagon below.



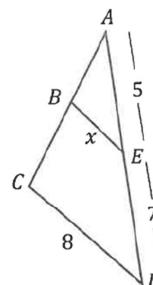
$$\frac{360}{8} = 45^\circ \checkmark$$

1

Question 21

$\triangle ABE$ is similar to $\triangle ACD$.

Find the value of x .



2

$$\frac{x}{5} = \frac{8}{12} \checkmark$$

$$\begin{aligned} x &= \frac{40}{12} \\ x &= \frac{10}{3} \end{aligned} \quad \left. \right\} \checkmark$$

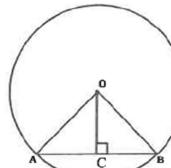
$$\begin{aligned} \text{OR} \quad \frac{x}{8} &= \frac{5}{12} \checkmark \\ x &= \frac{40}{12} \\ x &= \frac{10}{3} \end{aligned} \quad \left. \right\} \checkmark$$

2

Question 22

In the diagram below, O is the centre of the circle.

OC is perpendicular to AB .



3

i) Prove that $\triangle OAC \cong \triangle OBC$.

one mark
off per error

- In $\triangle OAC$ and $\triangle OBC$,
1. $OA = OB$ (equal radii)
 2. $\angle OCB = 90^\circ = \angle OCA$ (data)
 3. $OC = OC$ (common)
- $\therefore \triangle OAC \cong \triangle OBC$ (RHS) \checkmark

3

ii) Explain why OC bisects AB .

$AC = BC$ (corresponding sides of congruent triangles) \checkmark

$\therefore OC$ bisects AB .

1

- 13 -

- 29 -

- 30 -

Part H: Probability (6 marks)

Question 23

The letters of CRICKETER are each written on a card and placed in a bag.
A letter is drawn out at random.

i) Find $P(C)$.

$$\frac{2}{9} \quad \checkmark$$

ii) A card with the letter C is removed from the bag and **not** replaced.

A second card is then removed from the bag.

Find the probability that a C is shown on the second card.

$$\frac{1}{8} \quad \checkmark \quad \text{num} \\ \quad \quad \quad \text{denom}$$

Question 24

A group of males and females were asked whether they agree or disagree with the following statement.

"Male and female sports players should have equal pay."

The two-way table below indicates some of the results.

	Agree	Disagree	Total
Male	37	12	49
Female	28	9	37
Total	65	21	86

i) How many females were surveyed?

$$37 \quad \checkmark$$

ii) A person is chosen at random.

What is the probability this person agreed that men and women should have equal pay in sport?

$$\frac{65}{86} \quad \checkmark$$

Part I: Coordinate Geometry and Graphs (8 Marks) Student name:..... Teacher's Initials:.....

Question 25

Find the distance between $(-3, 1)$ and $(7, 6)$ in simplified surd form.

1

$$d = \sqrt{(7-3)^2 + (6-1)^2} \quad \checkmark$$

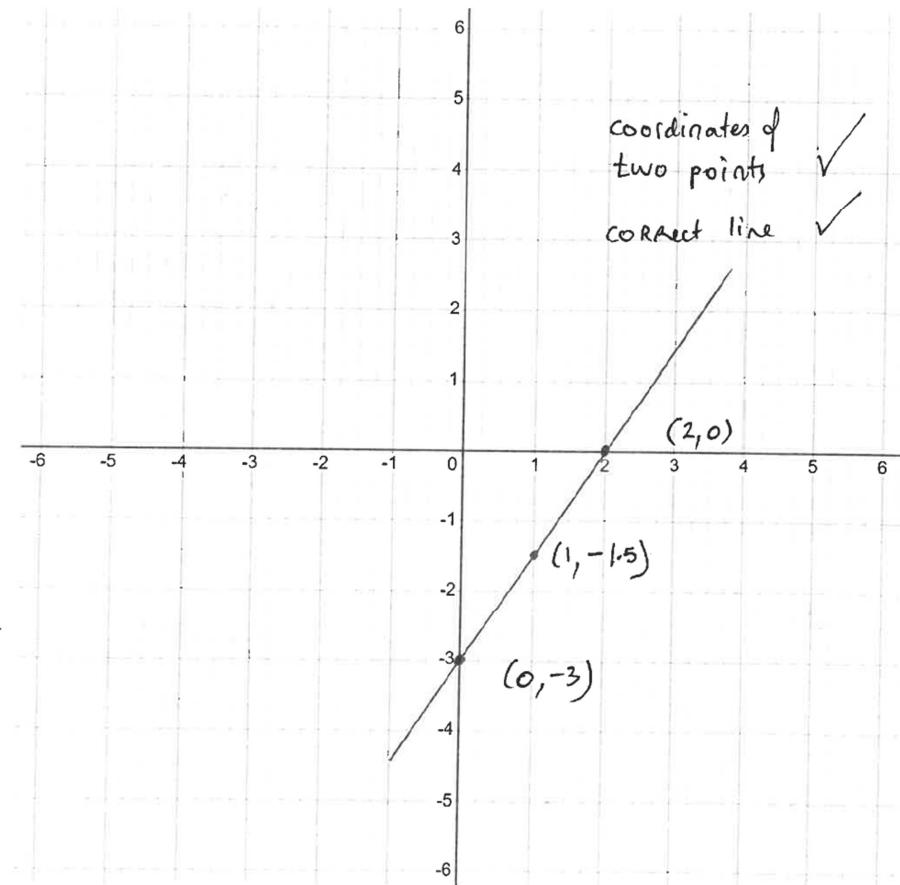
2

$$= \sqrt{125} \\ = 5\sqrt{5} \quad \checkmark$$

Question 26

Sketch $y = \frac{3}{2}x - 3$, labelling two points.

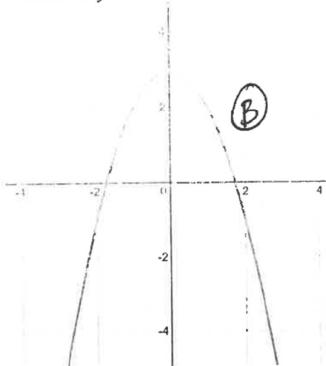
2



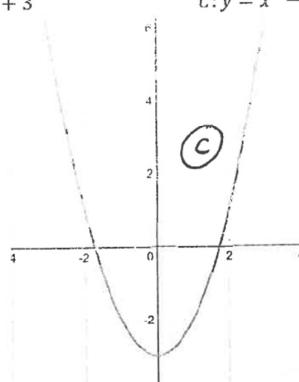
Question 27

Match the graph with the equation.

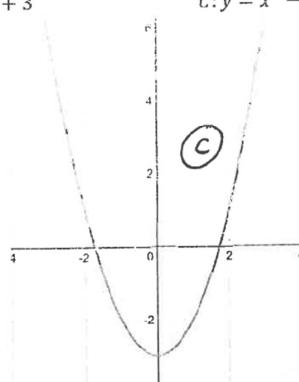
$$A: x^2 + y^2 = 9$$



$$B: y = -x^2 + 3$$



$$C: y = x^2 - 3$$



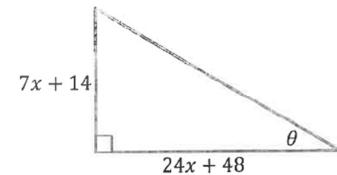
2

Part J: Mixed Questions (11 Marks)**Question 28**

i) Find the value of θ to the nearest degree.

Student name:
Teacher's Initials:

2



$$\tan \theta = \frac{7x+14}{24x+48}$$

$$= \frac{7(x+2)}{24(x+2)}$$

$$= \frac{7}{24} \quad \checkmark$$

$$\theta = 16^\circ \quad \checkmark$$

ii) Given that the hypotenuse has a length of 275cm, find x .

$$(7x+14)^2 + (24x+48)^2 = 275^2 \quad \checkmark$$

$$7^2(x+2)^2 + 24^2(x+2)^2 = 275^2$$

$$(x+2)^2(7^2+24^2) = 275^2$$

$$(x+2)^2 = \frac{275^2}{(7^2+24^2)} = 121 \quad \checkmark$$

$$x+2 = 11$$

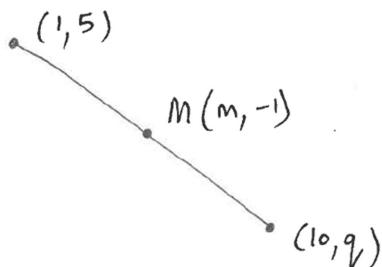
$$x = 9 \quad \checkmark$$

Question 28

The coordinates of the midpoint of $(1, 5)$ and $(10, q)$ are $(m, -1)$.

Find the values of q and m .

2



$$q = -7 \quad \checkmark$$

$$m = 5.5 \quad \checkmark$$

Question 30

Natalija is going on a journey in two stages.

The first stage takes $(x + 5)$ seconds with an average speed of $(2x - 1)$ m/s.

The second stage takes $(x - 1)$ seconds with an average speed of $(x - 3)$ m/s.

Find an expression for the average speed for the entire journey.

(Note: average speed = $\frac{\text{total distance}}{\text{total time}}$)

$$\text{distance} = \text{speed} \times \text{time}$$

$$\text{Distance travelled in first stage} = (2x - 1)(x + 5)$$

$$\text{Distance travelled in second stage} = (x - 3)(x - 1)$$

$$\therefore \text{Average speed} = \frac{(2x - 1)(x + 5) + (x - 3)(x - 1)}{(x + 5) + (x - 1)}$$

✓ numerator
✓ denominator

$$= \frac{2x^2 + 9x - 5 + x^2 - 4x + 3}{2x + 4}$$

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

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

$$= \frac{3x - 1}{2} \quad \text{m/sec}$$

✓

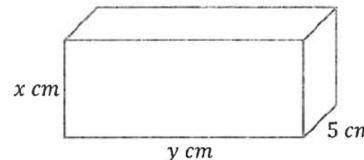
3

Question 31

The rectangular prism has a volume of 240 cm^3 and a surface area of 286 cm^2 .

Find x and y .

3



$$5xy = 240$$

$$xy = 48 \quad \text{--- } ①$$

sub ① into ② to get

$$96 + 10x + 10y = 286$$

$$10x + 10y = 190$$

$$x + y = 19$$

We seek two numbers whose sum is 19 and whose product is 48.

They are 3 and 16.

$$\text{So } x = 3 \quad \text{and } y = 16$$

(or guess and check method)

End of Paper

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