Name …… **CLASS TEACHER:** ……..……..

Year 10
Common Task 2 2022
MATHEMATICS

Instructions

- Time allowed 95 minutes
- All questions may be attempted on the examination paper.
- Calculators may be used.
- All necessary working should be shown where indicated. Full marks may not be awarded for careless or badly arranged work.

Topics Covered	Syllabus Reference	Outcome Description	Section
Quadratic Expressions/ Equations	MA5.2-6NA MA5.3-5NA MA5.3-7NA	Simplifies algebraic fractions, and expands and factorises quadratic expressions Selects and applies appropriate algebraic techniques to operate with algebraic expressions. Solves complex linear, quadratic, simple cubic and simultaneous equations, and rearranges literal equations.	A
Trigonometry	MA5.1-10MG MA5.2-13MG MA5.3-15MG	Applies trigonometry, given diagrams, to solve problems, including problems involving angles of elevation and depression Applies trigonometry to solve problems, including problems involving bearings Applies Pythagoras' theorem, trigonometric relationships, the sine rule, the cosine rule and the area rule to solve problems, including problems involving three dimensions	B
Non-Linear Graphs	MA5.2-8NA MA5.3-9NA	Solves linear and simple quadratic equations, linear inequalities and linear simultaneous equations, using analytical and graphical techniques Sketches and interprets a variety of non-linear relationships	C
Working Mathematically	MA5.2-1WM MA5.2-2WM MA5.3-3WM	Uses and interprets formal definitions and generalisations when explaining solutions and/or conjectures Generalises mathematical ideas and techniques to analyse and solve problems efficiently Uses deductive reasoning in presenting arguments and formal proofs	D

Part	A	B	C	D	Total	%
Marks	(22)	(22)	(33)	(16)	(93)	

Section A: Quadratic Expressions and Equations (22 marks)

Question 1 (4 Marks)

Expand the following and simplify where possible:

a) $(2x+1)^2 =$ **1**

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b) $3(x-5)^2 =$ **1**

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c) $m(m-6)-m(3-m)=$ **2**

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Question 2 (6 Marks)

Factorise fully:

a) $9y^2-12y=$ **1**

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b) $x^2-16x+63=$ **1**

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c) $4m+4n-am-an=$ **2**

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d) $4k^2-100=$ **2**

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Marker's Use only

Question 3 (6 Marks)

Solve for x:

a) $x^2 = 8x$ **2**

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b) $10x^2 - 17x + 3 = 0$ **2**

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c) $\frac{x+3}{x} = 2x$ **2**

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Question 4 (3 Marks)

(i) Solve the quadratic equation by completing the square (answer in surd form). **2**

$$x^2 - 10x + 6 = 0$$

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(ii) Use the quadratic formula to verify your answer/s above. **1**

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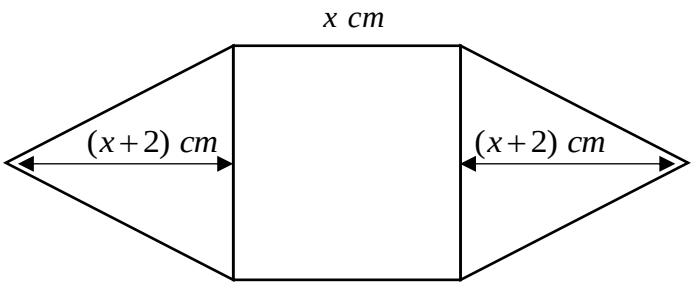
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Marker's Use only

Question 5 (3 Marks)

The shape below is made up of a square and two congruent triangles.
It has an area of $60\ cm^2$.



a) Write an equation showing this information. **1**

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b) Solve the equation to find the value of x: **2**

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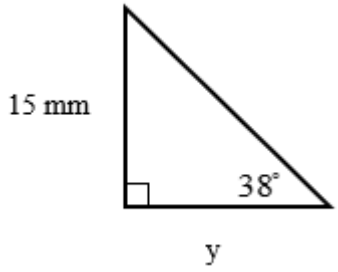
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End of Section A

Section B: Trigonometry (22 marks)

Question 1 (2 Marks)

Find the value of y correct to 1 decimal place. **2**



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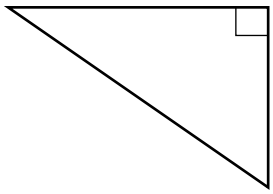
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Question 2 (2 Marks)

Label the right triangle below, given $\cos B = \frac{5}{13}$, to find $\tan B = ?$ **2**



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Question 3 (3 Marks)

Given $\frac{\sin 52^o 21'}{11} = \frac{\sin\theta}{9}$ find the acute angle θ, correct to the nearest minute. **3**

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Question 4 (2 Marks)

Find the exact value of $\sin 225^o$ **2**

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Marker's Use only

Question 5 (2 Marks)

The angle of depression from the top of a tree to a point P, on the ground, is 30^o. **2**

If P is 28 metres from the base of the tree **show** that the exact value of the height of the tree h, is given by $\frac{28\sqrt{3}}{3}$ metres.

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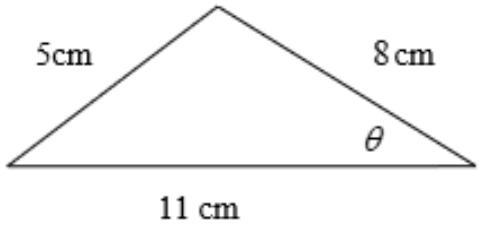
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Question 6 (5 Marks)

Use the information in each triangle to find all possible values of angle θ (to the nearest degree)?

a) **2**



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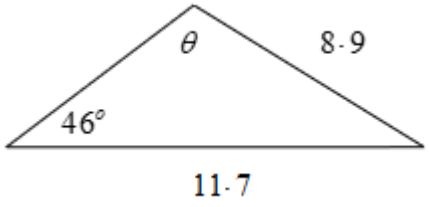
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b) **3**



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Question 7 (6 Marks)

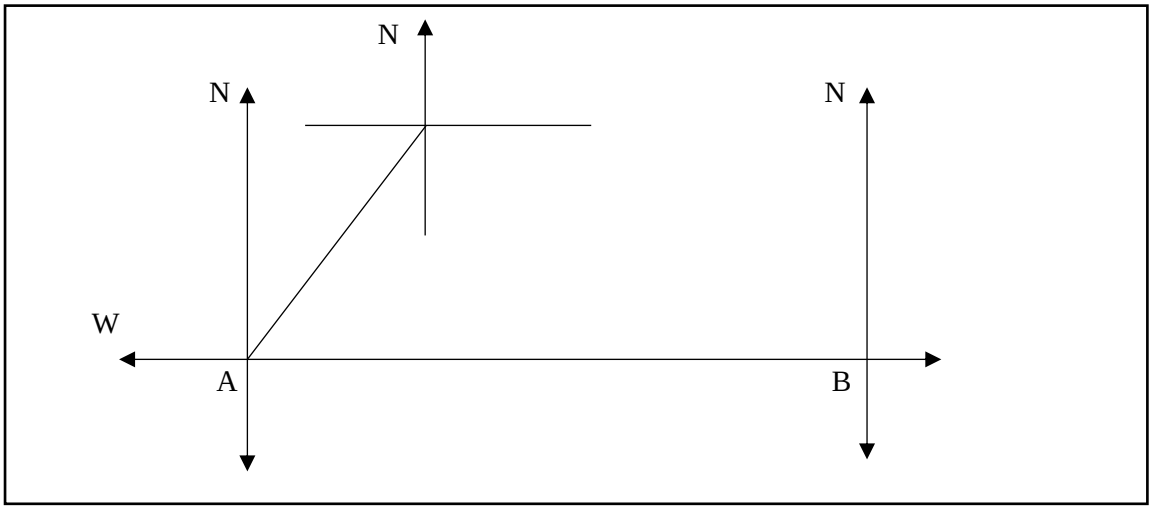
The positions of three different monuments (statues) A, B and C in three separate towns form a triangle on a tourist map.

A is due West of B

C lies on a bearing of 035^o from A

and the bearing of B from C is 130^o.

a) Complete the diagram, clearly labelling the information above. **1**



b) What is the bearing of A from C? …….. **1**

c) If monument A and B are 138 kilometres apart find the distance between monuments A and C (to the nearest km). **3**

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d) Hence, or otherwise calculate the triangular area between the three monuments A, B and C. **1**

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Marker's Use only

End of Section B

Section C: Non-Linear Graphs (33 marks)

Question 1 (8 Marks)

a) For the parabola with equation $y = 4x^2 - 8x - 5$ find the:

(i) Equation of the axis of symmetry. **2**

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(ii) Co-ordinates of the vertex. **1**

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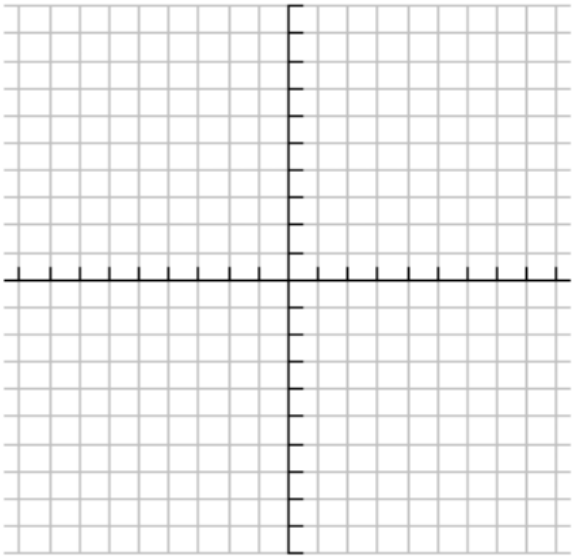
b) Calculate the value of the discriminant and explain what this tells you about the graph of $y = 4x^2 - 8x - 5$. **2**

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c) Sketch the graph of $y = 4x^2 - 8x - 5$, showing the main features, including all intercepts. **3**



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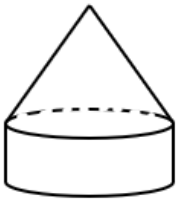
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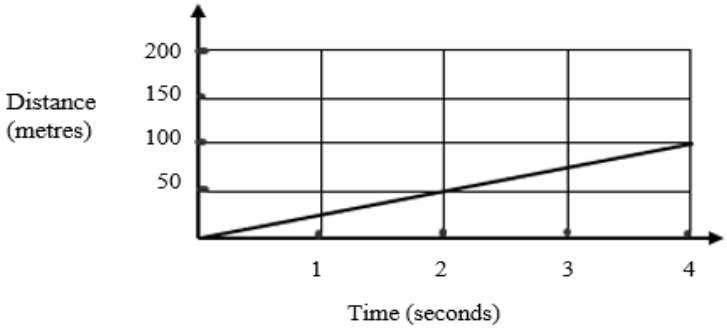
Question 2 (4 Marks)

a) The container below is filled with sand at a constant rate. Use the axes provided to sketch the graph showing how the level of sand in the conatiner changes over time. **2**





b) The distance-time graph for a moving object is shown.



Find the speed of the object in km per hour. **2**

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Question 3 (4 Marks)

a) Given $f(x)=3x^2+5x-12$, find $f(-2)$. **1**

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b) (i) Find $f^{-1}(x)$, the inverse function of $y=\sqrt{x}$ **2**

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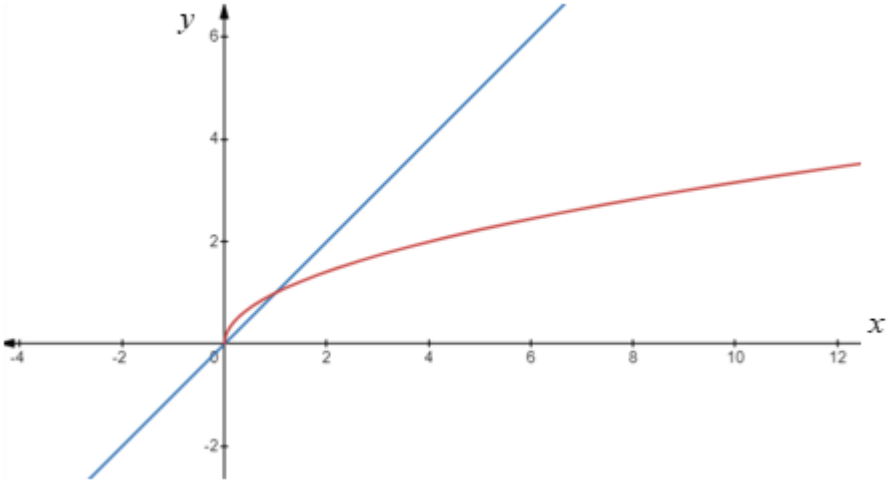
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Marker's Use only

Question 3 (continued)

b)

(ii) Complete the sketch below showing the graph of this function and its inverse: **1**



Question 4 (4 Marks)

a) Solve the pair of simultaneous equations: **2**

$$y = x^2 + 4x$$
$$2x - y - 1 = 0$$

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b) Prove that the graphs of $y = x - 4$ and $y = x^2 - x - 2$ do not intersect. **2**

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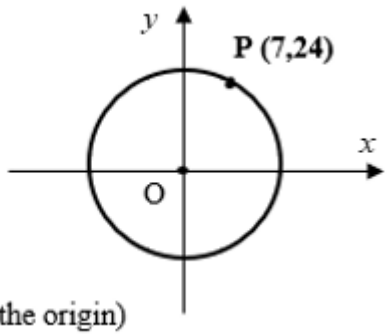
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Question 5 (7 Marks)

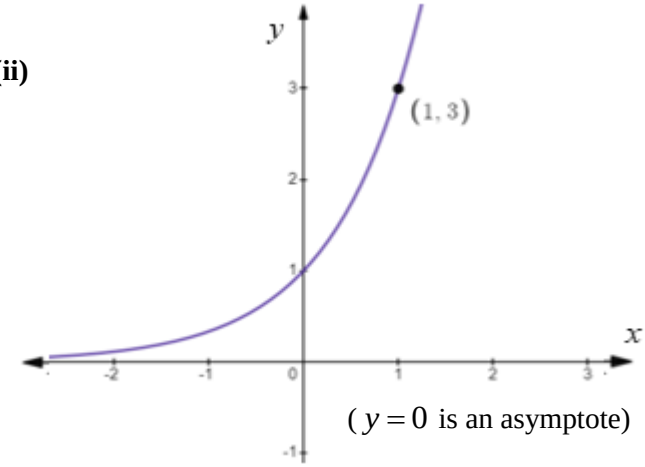
a) Use the given information to determine the equation of the curves below: **3**

(i)



(centre O, the origin)

(ii)



($y = 0$ is an asymptote)

(i) ……...

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(ii) ……

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b) Find the range for each curve and state whether they are functions. **4**

(i) ……...

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(ii) ……

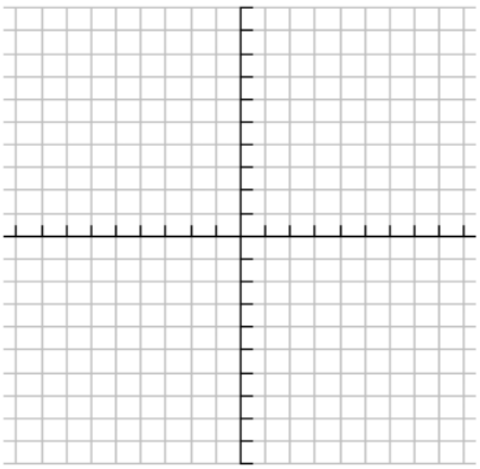
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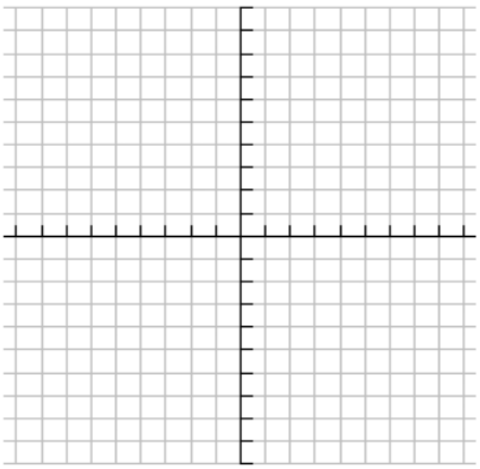
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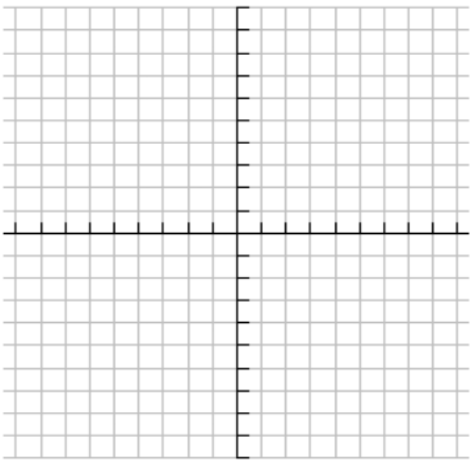
Question 6 (6 Marks)

On the Number Planes provided draw a neat sketch of the graphs for the following curves: **6**

(i) $y = (x-2)^3$ (ii) $y = -\sqrt{9-x^2}$ (iii) $x^2 + (y-1)^2 = 4$







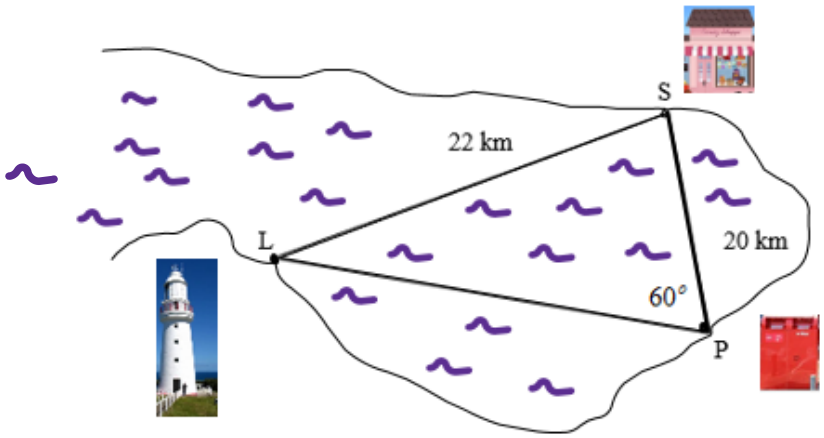
End of Section C

Marker's Use only

Section D: Working Mathematically (16 marks)

Question 1 (3 Marks)

In the diagram, the shop at S is 20 kilometres across the bay from the Post office at P.
The distance from the shop to the lighthouse L, is 22 kilometres and angle $SPL = 60^o$



If the distance PL is x metres

(i) Use the Cosine rule to show that $x^2 - 20x - 84 = 0$ **1**

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(ii) Hence, find the distance from the Post Office to the lighthouse (correct to the nearest km). **2**

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Question 2 (2 Marks)

Prove $\dfrac{\cos(90^o - \theta)\sin\theta}{\sin(90^o - \theta)\cos\theta} = \tan^2\theta$ HINT: $(\tan\theta)^2 = \tan^2\theta$

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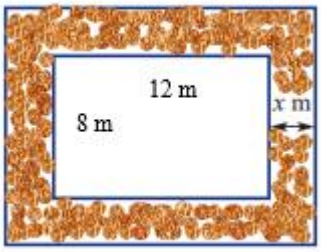
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Question 3 (3 Marks)

A rectangular swimming pool measuring, 12metres by 8 metres, is surrounded by a pebbled path of uniform width. If the area of the pebbled path is 224 square metres, find its width.



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Question 4 (3 Marks)

A sail designer wishes to maximise the sail area for a particular yacht. If the length of the base (b) and the height (h) of the triangular sail is to have a sum of 16:



(i) Show that the area of the sail is given by $A = 8b - \frac{1}{2}b^2$ **1**

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(ii) Hence, find the maximum sail area. **2**

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Marker's Use only

Question 5 (3 Marks)

Simplify fully $\dfrac{3x^2-48}{x^2+8x+16} \div \dfrac{(x-1)^2-9}{3x+12}$

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Question 6 (2 Marks)

The graph of a hyperbola is of the form $y = \dfrac{a}{x-h} + k$. State the rule for the hyperbola graphed below:

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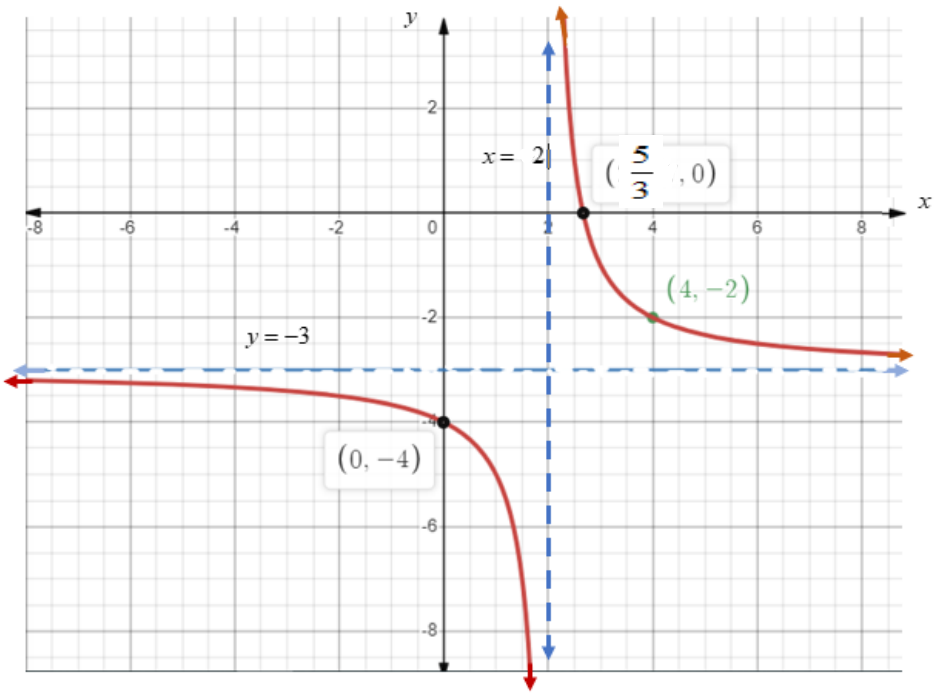
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End of Test

Marker's Use only

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Name ..... Solutions #2 ..... CLASS TEACHER: .....

Year 10
Common Task 2 2022
MATHEMATICS

Instructions

- Time allowed 95 minutes
- All questions may be attempted on the examination paper.
- Calculators may be used.
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Trigonometry	MA5.1-10MG MA5.2-13MG MA5.3-15MG	Applies trigonometry, given diagrams, to solve problems, including problems involving angles of elevation and depression Applies trigonometry to solve problems, including problems involving bearings Applies Pythagoras' theorem, trigonometric relationships, the sine rule, the cosine rule and the area rule to solve problems, including problems involving three dimensions	B
Non-Linear Graphs	MA5.2-8NA MA5.3-9NA	Solves linear and simple quadratic equations, linear inequalities and linear simultaneous equations, using analytical and graphical techniques Sketches and interprets a variety of non-linear relationships	C
Working Mathematically	MA5.2-1WM MA5.2-2WM MA5.3-3WM	Uses and interprets formal definitions and generalisations when explaining solutions and/or conjectures Generalises mathematical ideas and techniques to analyse and solve problems efficiently Uses deductive reasoning in presenting arguments and formal proofs	D

Part	A	B	C	D	Total	%
Marks	(22)	(22)	(33)	(16)	(93)	

Section A: Quadratic Expressions and Equations (22 marks)

Question 1 (4 Marks)

Expand the following and simplify where possible:

a) $(2x+1)^2 =$ $4x^2 + 4x + 1$ ✓ **1**

b) $3(x-5)^2 =$ $3(x^2 - 10x + 25)$ **1**
$= 3x^2 - 30x + 75$ ✓

c) $m(m-6) - m(3-m) =$ **2**
$m^2 - 6m - 3m + m^2$ ✓
$= 2m^2 - 9m$ ✓

Question 2 (6 Marks)

Factorise fully:

a) $9y^2 - 12y =$ $3y(3y-4)$ ✓ **1**

b) $x^2 - 16x + 63 =$ $(x-7)(x-9)$ ✓ **1**

c) $4m + 4n - am - an =$ **2**
$4(m+n) - a(m+n)$ ✓
$= (m+n)(4-a)$ ✓

d) $4k^2 - 100 =$ $4(k^2 - 25)$ ✓ **2**
$= 4(k-5)(k+5)$ ✓

OR $(2k-10)(2k+10)$
$= 4(k-5)(k+5$

Marker's Use only
10

Question 3 (6 Marks)

Solve for x:

a) $x^2 = 8x$ **2**

$x^2 - 8x = 0$ ✓

$x(x-8) = 0$

$\therefore x = 0, 8$ ✓

b) $10x^2 - 17x + 3 = 0$ **2**

$(5x - 1)(2x - 3) = 0$

$5x - 1 = 0, \quad 2x - 3 = 0$

$\therefore x = \frac{1}{5}, \quad x = \frac{3}{2}$ ✓✓

c) $\frac{x+3}{x} = 2x$ **2**

$x + 3 = 2x^2$

$0 = 2x^2 - x - 3$

$0 = (2x - 3)(x + 1)$

$\therefore 2x - 3 = 0, \quad x + 1 = 0$

$x = \frac{3}{2}, \quad x = -1$

Question 4 (3 Marks)

(i) Solve the quadratic equation by completing the square (answer in surd form). **2**

$x^2 - 10x + 6 = 0$

$x^2 - 10x + 25 = -6 + 25$

$(x-5)^2 = 19$ ✓

$x - 5 = \pm\sqrt{19}$

$x = 5 \pm \sqrt{19}$ ✓

(ii) Use the quadratic formula to verify your answer/s above. **1**

$x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4 \times 1 \times 6}}{2(1)}$

$= \frac{10 \pm \sqrt{100 - 24}}{2}$

$= \frac{10 \pm \sqrt{76}}{2} = \frac{10 \pm \sqrt{4 \times 19}}{2} = \frac{10 \pm 2\sqrt{19}}{2}$

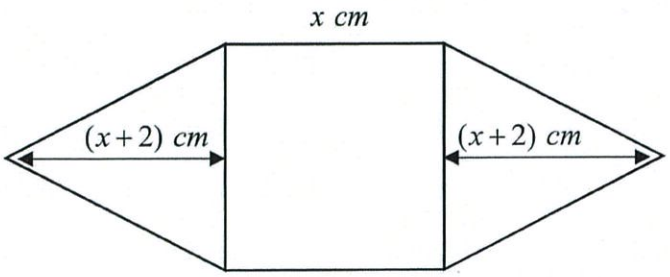
$= 5 \pm \sqrt{19}$ (i) verified. ✓

Marker's Use only

9

Question 5 (3 Marks)

The shape below is made up of a square and two congruent triangles.
It has an area of $60\ cm^2$.



a) Write an equation showing this information. **1**

$x^2 + 2\left(\frac{1}{2} \times x \times (x+2)\right) = 60$ ✓

$x^2 + x^2 + 2x = 60$

$\therefore 2x^2 + 2x - 60 = 0$

b) Solve the equation to find the value of x: **2**

$2(x^2 + x - 30) = 0$

$(x+6)(x-5) = 0$

$x+6 = 0$, $x-5 = 0$ ✓

$\therefore x = -6, 5$

$x = -6$ not valid , only $x = 5$ is a soln as as x represents length. ✓

Marker's Use only

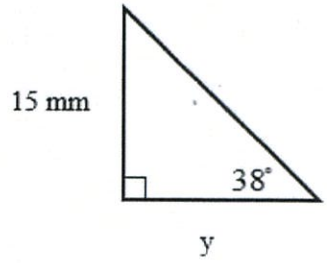
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End of Section A

Section B: Trigonometry (22 marks)

Question 1 (2 Marks)

Find the value of y correct to 1 decimal place. **2**



$\tan 38° = \frac{15}{y}$ ✓

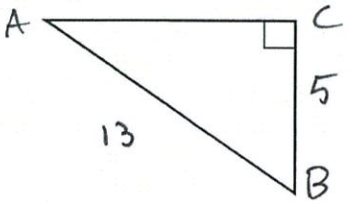
$y = \frac{15}{\tan 38°}$

$= 19.19...$ ✓

$\therefore$ **19.2**

Question 2 (2 Marks)

Label the right triangle below, given $\cos B = \frac{5}{13}$, to find $\tan B = ?$ **2**



(3rd side): $AC = \sqrt{13^2 - 5^2}$ ✓

$= 12$

$\therefore \tan B = \frac{12}{5}$ ✓

Question 3 (3 Marks)

Given $\frac{\sin 52°21'}{11} = \frac{\sin\theta}{9}$ find the acute angle θ, correct to the nearest minute. **3**

$\sin\theta = \frac{9\sin 52°21'}{11}$ ✓

$= 0.6478...$

$\theta = \sin^{-1}(0.6478...) = 40°22'33''$ ✓

$\therefore$ **40°23'** ✓

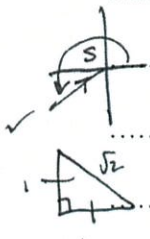
Question 4 (2 Marks)

Find the exact value of $\sin 225°$ **2**

$\sin 225 = -\sin(180+45)°$ ✓

$= -\frac{1}{\sqrt{2}}$ ✓

(OR) $-\frac{\sqrt{2}}{2}$



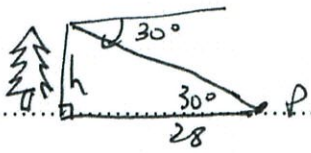
Marker's Use only

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Question 5 (2 Marks)

The angle of depression from the top of a tree to a point P, on the ground, is 30°. **2**

If P is 28 metres from the base of the tree **show** that the exact value of the height of the tree h, is given by $\frac{28\sqrt{3}}{3}$ metres.



$\tan 30^\circ = \frac{h}{28}$ ✓

$h = 28 \tan 30^\circ$ (since $\tan 30^\circ = \frac{1}{\sqrt{3}}$)

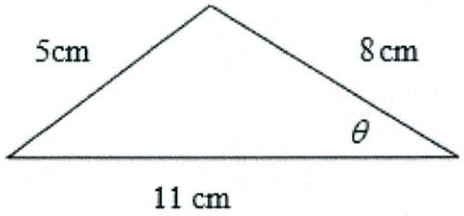
$= 28\left(\frac{1}{\sqrt{3}}\right) \times \frac{\sqrt{3}}{\sqrt{3}}$

$= \frac{28\sqrt{3}}{3}$ ✓ * (accept $\frac{28}{\sqrt{3}}$)

Question 6 (5 Marks)

Use the information in each triangle to find all possible values of angle θ (to the nearest degree)?

a) **2**



$\cos\theta = \frac{8^2 + 11^2 - 5^2}{2 \times 8 \times 11}$

$= \frac{160}{176}$ ✓

$\theta = \cos^{-1}\left(\frac{160}{176}\right) = 0.90909...$

$= 24.6$

$\therefore 25^\circ$ ✓

b) **3**



$\frac{\sin\theta}{11.7} = \frac{\sin 46^\circ}{8.9}$ ✓

$\sin\theta = \frac{11.7 \sin 46^\circ}{8.9}$

$= 0.9456...$ ✓

$\theta = \sin^{-1}(\quad)$

$\theta = 71^\circ$ or $180 - 71^\circ = 109^\circ$ (nearest degree) ✓

(2) marks one angle

(3) marks for both angles

Marker's Use only

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Question 7 (6 Marks)

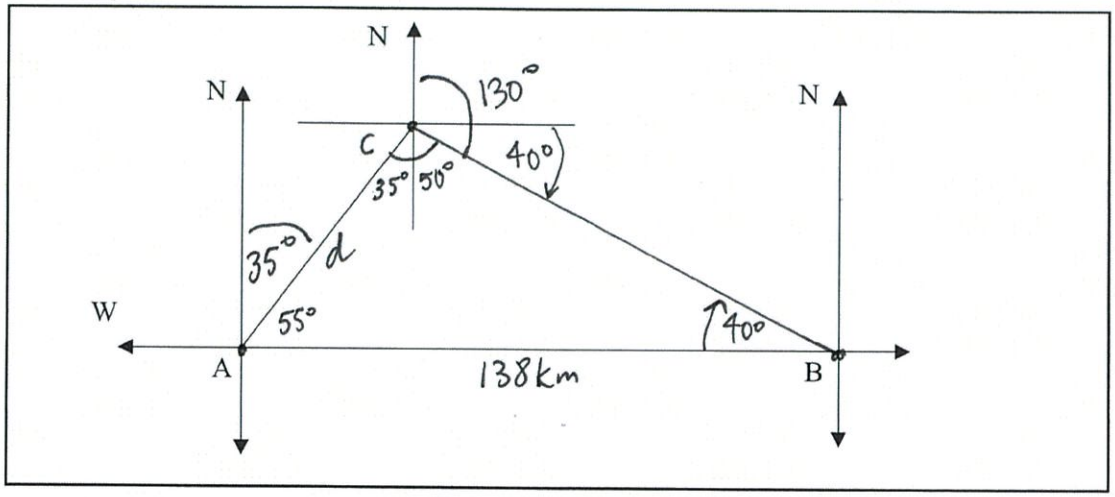
The positions of three different monuments (statues) A, B and C in three separate towns form a triangle on a tourist map.

A is due West of B

C lies on a bearing of 035^o from A

and the bearing of B from C is 130^o.

a) Complete the diagram, clearly labelling the information above. **1**



labels at least
130°
35°
C

b) What is the bearing of A from C? $180+35 = 215°$ ✓ **1**

(or) $270 - 55 = 215°$

c) If monument A and B are 138 kilometres apart find the distance between monuments A and C (to the nearest km). **3**

let AC = d

$\frac{d}{\sin 40°} = \frac{138}{\sin 85°}$ ✓ ← correct angles

✓

$d = \frac{138 \sin 40°}{\sin 85°}$ ← correct working/rule

← answer ignore rounding

$= 89.04... \div 89$ km ✓

d) Hence, or otherwise calculate the triangular area between the three monuments A, B and C. **1**

$A = \frac{1}{2}(89)(138)\sin 55°$

$= 5030.4 \text{ km}^2$

Marker's Use only

6

End of Section B

Section C: Non-Linear Graphs (33 marks)

Question 1 (8 Marks)

a) For the parabola with equation $y = 4x^2 - 8x - 5$ find the:

(i) Equation of the axis of symmetry. **2**

$x = \frac{-b}{2a} = \frac{-(-8)}{2(4)}$ ✓ the eqn. of the axis of symmetry

$= \frac{8}{8} = 1$ ∴ is $x = 1$ ✓

(ii) Co-ordinates of the vertex. **1**

when $x = 1$, $y = 4(1)^2 - 8(1) - 5$

$= -9$

∴ vertex is at $(1, -9)$ ✓

b) Calculate the value of the discriminant and explain what this tells you about the graph of $y = 4x^2 - 8x - 5$. **2**

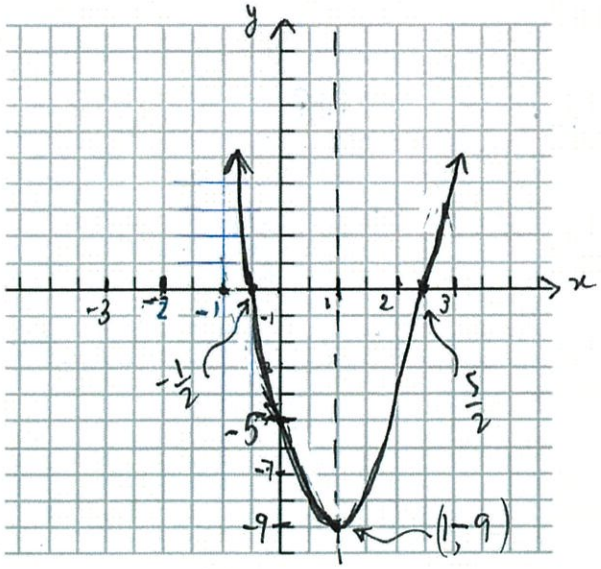
$\Delta = b^2 - 4ac = (-8)^2 - 4 \times 4 \times -5$

$= 64 + 80$

$= 144$ ∴ the graph (parabola) has 2 rational roots, (two x intercepts) ✓

> 0 ✓

c) Sketch the graph of $y = 4x^2 - 8x - 5$, showing the main features, including all intercepts. **3**



✓ x and y intercepts

✓ vertex

✓ shape / curve / graph labelling axes

$4x^2 - 8x - 5 = 0$

$(2x - 5)(2x + 1) = 0$

$x = \frac{5}{2}$, $x = -\frac{1}{2}$

when $y = 0$, x intercepts

when $x = 0$

$y = -5$

$(0, -5)$

y intercept

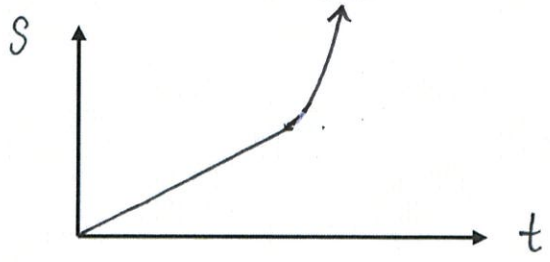
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Question 2 (4 Marks)

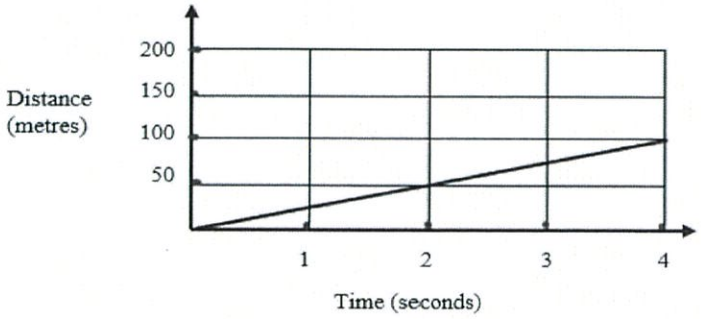
a) The container below is filled with sand at a constant rate. Use the axes provided to sketch the graph showing how the level of sand in the conatiner changes over time. **2**





✓ graph
✓ label axes

b) The distance-time graph for a moving object is shown.



Find the speed of the object in km per hour. **2**

(or) 50m/2sec } 100m/4sec x15 ✓
(or) 25m/sec } 1500 m/min x60
90000m/h = 90km/h ✓

Question 3 (4 Marks)

a) Given $f(x) = 3x^2 + 5x - 12$, find $f(-2)$. **1**

$f(-2) = 3(-2)^2 + 5(-2) - 12$
$= 12 - 10 - 12$
$= -10$ ✓

b) (i) Find $f^{-1}(x)$, the inverse function of $y = \sqrt{x}$ **2**

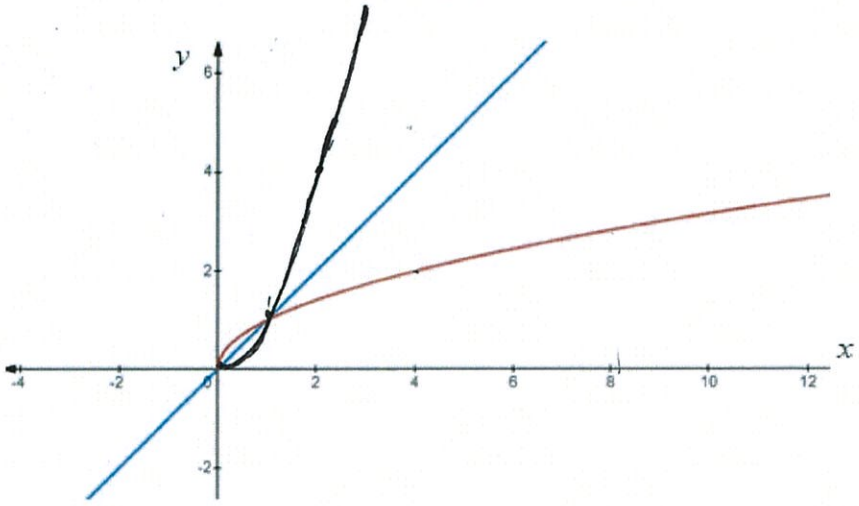
$x = \sqrt{y}$
$x^2 = y$, for $x \geq 0$
$f^{-1}(x) = x^2$, $x \geq 0$
✓ ✓

Marker's Use only
7

Question 3 (continued)

b)

(ii) Complete the sketch below showing the graph of this function and its inverse: **1**



✓

Question 4 (4 Marks)

a) Solve the pair of simultaneous equations: **2**

$y = x^2 + 4x$

$2x - y - 1 = 0 \longrightarrow y = 2x - 1$

$\therefore x^2 + 4x = 2x - 1$

$x^2 + 2x + 1 = 0$

$(x+1)^2 = 0$ ✓

$\therefore x = -1$

when $x = -1$

$y = (-1)^2 + 4(-1)$

$= 1 - 4$

$= -3$

soln (point of intersection)

$\therefore (-1, -3)$ ✓

b) Prove that the graphs of $y = x - 4$ and $y = x^2 - x - 2$ do not intersect. **2**

If $x^2 - x - 2 = x - 4$

$x^2 - 2x + 2 = 0$

$\Delta = (-2)^2 - 4 \times 1 \times 2$

$= -4$ ✓

$\Delta < 0$ ✓

$\therefore$ no solution i.e. no points of intersection

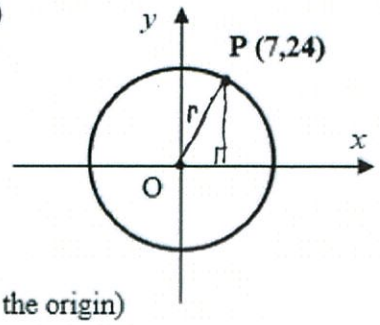
Marker's Use only

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Question 5 (7 Marks)

a) Use the given information to determine the equation of the curves below: **3**

(i)



(centre O, the origin)

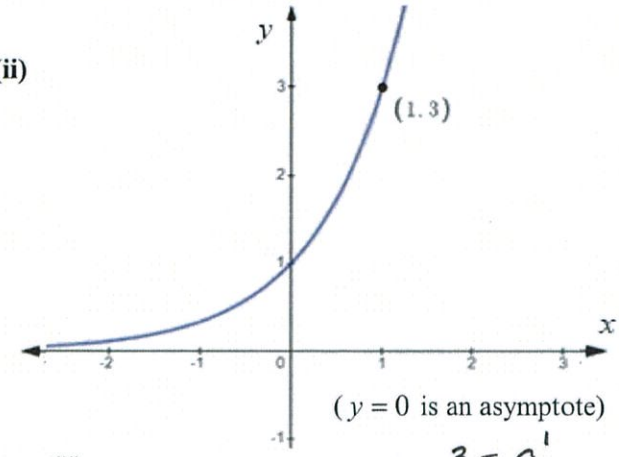
(i) $r = \sqrt{24^2+7^2}$

$= \sqrt{625} = 25$ ✓

$\therefore x^2 + y^2 = 25^2$ ✓

(OR) $(x^2+y^2 = 625)$

(ii)



($y = 0$ is an asymptote)

(ii) $y = a^x$ $3 = a^1$

$\therefore a = 3$

i.e. $y = 3^x$ ✓

b) Find the range for each curve and state whether they are functions. **4**

(i) Range: $-25 \leq y \leq 25$ ✓

Not a function ✓

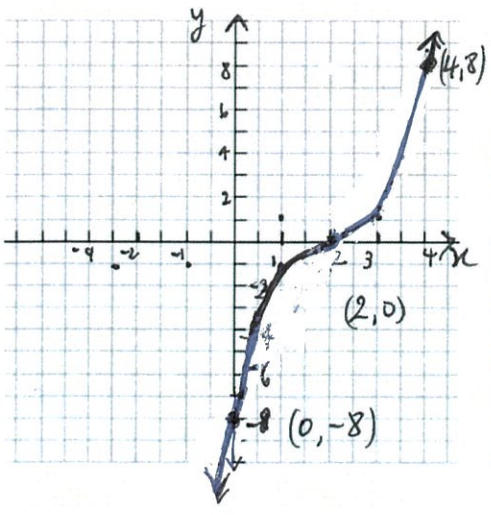
(ii) $y > 0$ ✓

Yes a function ✓

Question 6 (6 Marks)

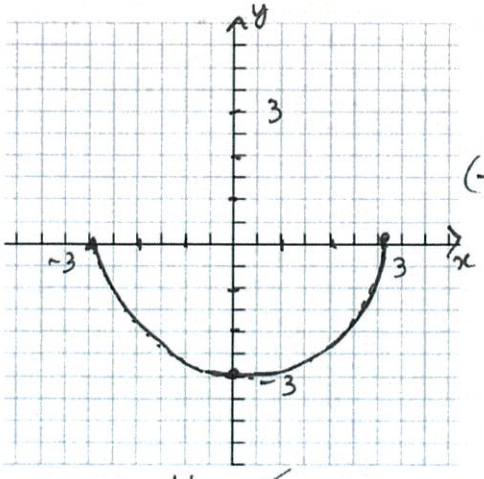
On the Number Planes provided draw a neat sketch of the graphs for the following curves: **6**

(i) $y = (x-2)^3$ (ii) $y = -\sqrt{9-x^2}$ (iii) $x^2 + (y-1)^2 = 4$



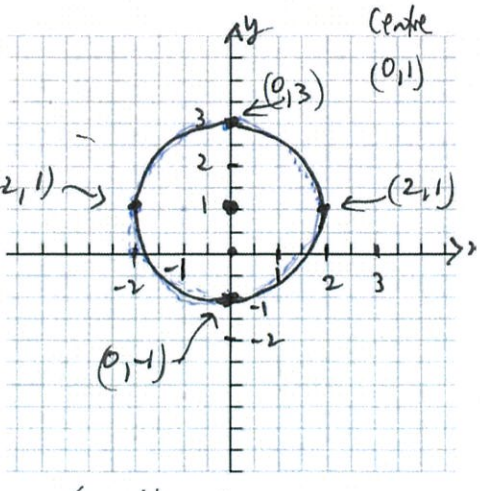
cubic/shape ✓

2 units Right ✓



radius ✓

Semi circle below x-axis ✓



✓ radius = 2

✓ Centre (0, 1)

End of Section C

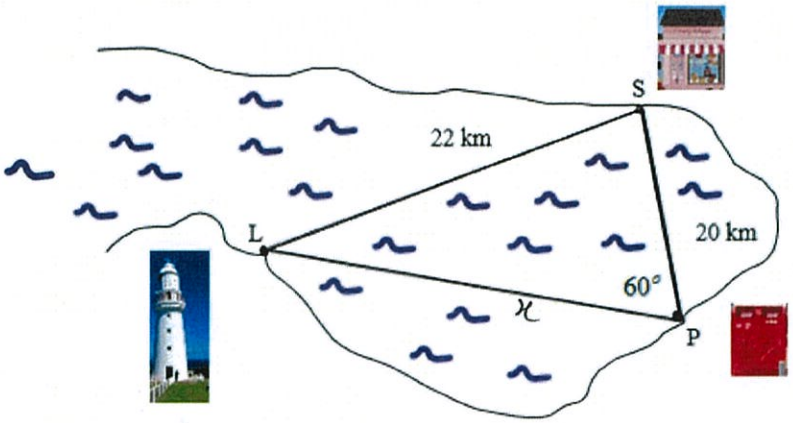
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Section D: Working Mathematically (16 marks)

Question 1 (3 Marks)

In the diagram, the shop at S is 20 kilometres across the bay from the Post office at P.
The distance from the shop to the lighthouse L, is 22 kilometres and angle SPL = 60^o



$(\cos 60° = \frac{1}{2})$

If the distance PL is x metres

(i) Use the Cosine rule to show that $x^2 - 20x - 84 = 0$ **1**

$22^2 = 20^2 + x^2 - 2 \times 20 \times x \times \cos 60°$ ✓

$484 = 400 + x^2 - 20x$

$0 = x^2 - 20x - 84$

(ii) Hence, find the distance from the Post Office to the lighthouse (correct to the nearest km). **2**

$x = \dfrac{20 \pm \sqrt{(-20)^2 - 4 \times 1 \times -84}}{2}$ ✓

$= \dfrac{20 \pm \sqrt{736}}{2}$

$= 23.56\ldots, -3.564$ (not valid negative answer)

$x \doteq 24$ km the only valid distance from P and L. ✓

Question 2 (2 Marks)

Prove $\dfrac{\cos(90^o - \theta)\sin\theta}{\sin(90^o - \theta)\cos\theta} = \tan^2\theta$ HINT: $(\tan\theta)^2 = \tan^2\theta$

LHS $= \dfrac{\sin\theta . \sin\theta}{\cos\theta . \cos\theta}$ ✓

$= \dfrac{\sin^2\theta}{\cos^2\theta}$ ✓

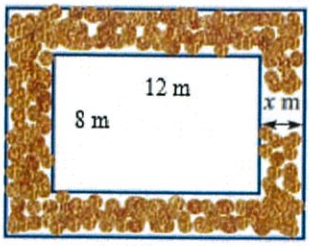
$= \tan^2\theta = RHS$

Marker's Use only

5

Question 3 (3 Marks)

A rectangular swimming pool measuring, 12metres by 8 metres, is surrounded by a pebbled path of uniform width. If the area of the pebbled path is 224 square metres, find its width.



Let x be the width of path:

$(12+2x)(8+2x) - 96 = 224$ ✓

$96 + 24x + 16x + 4x^2 - 96 = 224$

$4x^2 + 40x - 224 = 0$

$4(x^2 + 10x - 56) = 0$

$(x-4)(x+14) = 0$ ✓

$\therefore x = 4, \quad x = -14$

since -14 is not valid as a length

x, the width of the path is 4 m ✓

Question 4 (3 Marks)

A sail designer wishes to maximise the sail area for a particular yacht. If the length of the base (b) and the height (h) of the triangular sail is to have a sum of 16:



(i) Show that the area of the sail is given by $A = 8b - \frac{1}{2}b^2$ **1**

$A = \frac{bh}{2}$ and given $h + b = 16$

i.e. $h = 16 - b$

$A = \frac{1}{2}b(16-b)$ ✓

$= 8b - \frac{1}{2}b^2$

(ii) Hence, find the maximum sail area. **2**

$A = \frac{1}{2}b(16-b)$

max value since $a < 0$

occurs at vertex

$b = x = \frac{-(8)}{2(-\frac{1}{2})} = \frac{-8}{-1} = 8$ ✓

When $b = 8$

$A = 8(8) - \frac{1}{2}(8)^2$

$= 64 - 32$

$= 32$ ✓

$\therefore$ maximum sail area $= 32\text{m}^2$

Marker's Use only

6

Question 5 (3 Marks)

Simplify fully $\dfrac{3x^2-48}{x^2+8x+16} \div \dfrac{(x-1)^2-9}{3x+12}$

$= \dfrac{3(x^2-16)}{(x+4)^2} \times \dfrac{3(x+4)}{[(x-1)-3][(x-1)+3]}$ ✓

$= \dfrac{3(x+4)(x-4)}{(x+4)(x+4)} \times \dfrac{3(x+4)}{(x-4)(x+2)}$ ✓

$= \dfrac{9}{x+2}$ ✓

Question 6 (2 Marks)

The graph of a hyperbola is of the form $y = \dfrac{a}{x-h} + k$. State the rule for the hyperbola graphed below:

$y = \dfrac{a}{x-2} + (-3)$

$y = \dfrac{a}{x-2} - 3$

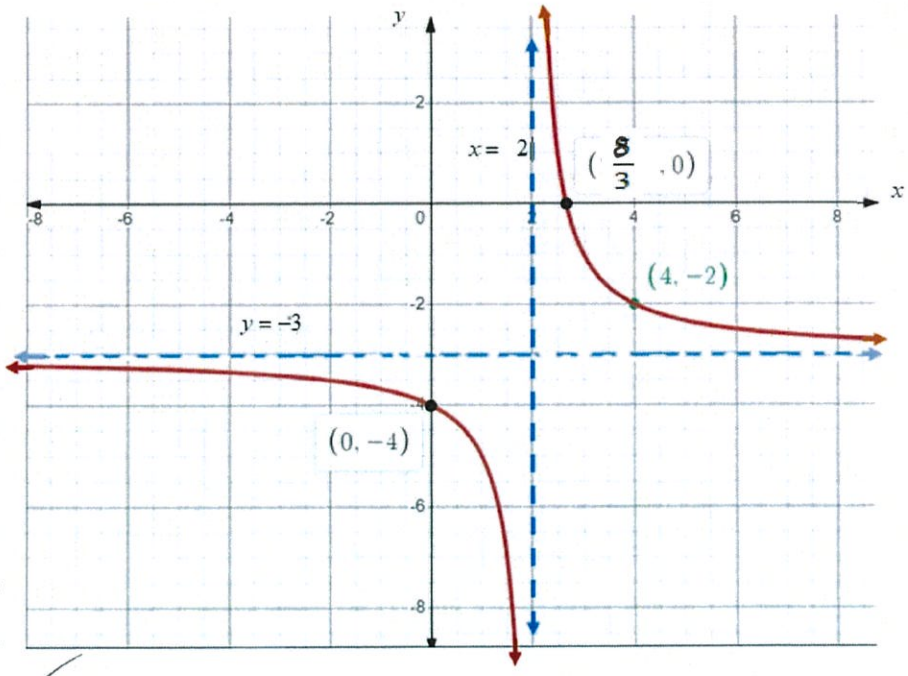
when $x = 0$, $y = -4$

then $-4 = \dfrac{a}{0-2} - 3$

$-1 = \dfrac{a}{-2}$ ✓

$\therefore a = 2$

ie. $y = \dfrac{2}{x-2} - 3$



✓

End of Test

Marker's Use only

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