Name:	Index No.:	Class:

Mathematical Formulae

PRESBYTERIAN HIGH SCHOOL

Compound Interest

MATHEMATICS **4045/01**
PAPER ONE

25 July 2022 Monday 2 hours

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SECONDARY FOUR NORMAL (ACADEMIC)
PRELIMINARY EXAMINATIONS

DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO.
READ THESE INSTRUCTIONS FIRST

Write your name, index number and class on all the spaces provided above.
Write in dark blue or black pen. You may use a soft pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
The number of marks is given in brackets [ ] at the end of each question or part question.
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 total number of marks for this paper is 80.

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.

Note that all the diagrams in this paper are not drawn to scale.

For Examiner's Use				
Category	Accuracy	Symbols	Others	*Marks Deducted*
Question No.				

Total Marks

Setter: Mrs Joyce Yeo
Vetter: Ms Cynthia Chua

Total amount = $P\left(1+\frac{r}{100}\right)^n$

Mensuration

Curved surface area of a cone = πrl

Surface area of a sphere = $4\pi r^2$

Volume of a cone = $\frac{1}{3}\pi r^2 h$

Volume of a sphere = $\frac{4}{3}\pi r^3$

Area of triangle ABC = $\frac{1}{2}ab\sin C$

Arc length = $r\theta$, where θ is in radians

Sector area = $\frac{1}{2}r^2\theta$, where θ is in radians

Trigonometry

$$\frac{a}{\sin A}=\frac{b}{\sin B}=\frac{c}{\sin C}$$

$$a^2=b^2+c^2-2bc\cos A$$

Statistics

Mean = $\frac{\Sigma fx}{\Sigma f}$

Standard deviation = $\sqrt{\frac{\Sigma fx^2}{\Sigma f}-\left(\frac{\Sigma fx}{\Sigma f}\right)^2}$

Answer **all** the questions.

1 **(a)** 1.75^2 -1.3 π $-1\frac{1}{3}$

Write these numbers in order of size, starting with the smallest.

Answer ....., ..., ..., ... [1]

(b) Express 73.4% as a fraction.

Answer ..... [1]

2

	Adult	Child (Ages 4 – 12)
One-Day Admission Ticket	\$68	\$58
Universal Express Pass	\$50	\$50

(Source: www.rwsentosa.com)

The table shows the cost for one-day admission ticket to Universal Studios.
The Universal Express Pass can be purchased to skip the queue at participating rides and shows.

Mr and Mrs Teo bought one-day admission tickets for themselves and their son (12 years old) and daughter (13 years old). They also bought Universal Express Passes for each of their two children.

Calculate the total cost of the tickets.

Answer \$ ..... [2]

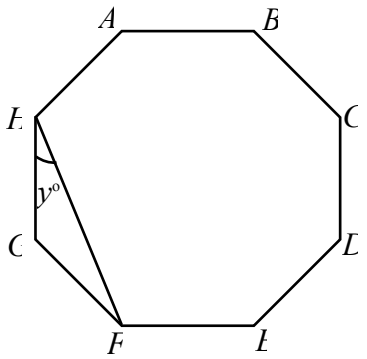
---

3 Solve $\frac{4}{5x-2}=3$.

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

---

4 The diagram shows a regular octagon *ABCDEFGH*.
Calculate *y*.



Answer $y =$ ..... [2]

---

5 *p* is inversely proportional to q^2.
When $p = 3$ when $q = 2$.

Find the value of *p* when $q = 10$.

Answer $p =$ ..... [2]

---

6 **(a)** Given that $\frac{5^6}{5^{-3} \times 5^0} = 5^v$, find *v*.

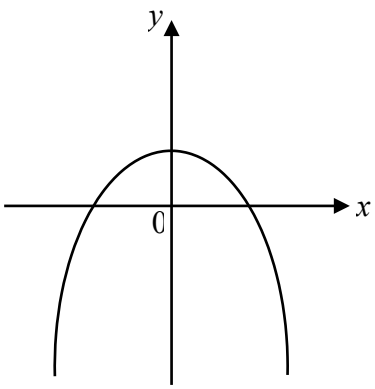
Answer $v =$ ..... [1]

(b) Given that $\frac{1}{64} = 4^w$, find *w*.

Answer $w =$ ..... [1]

---

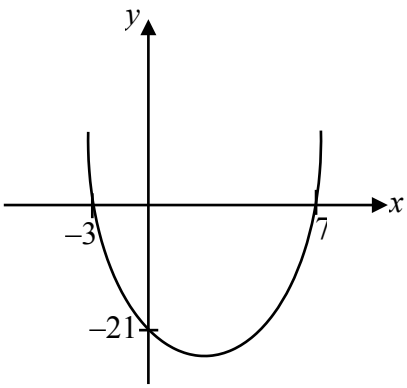
7 **(a)**



The diagram shows the sketch of $y = -x^2 + k$.
State a possible value of k.

Answer $k =$ ..... [1]

(b)



State the equation of the line of symmetry of this graph of a quadratic function.

Answer ..... [1]

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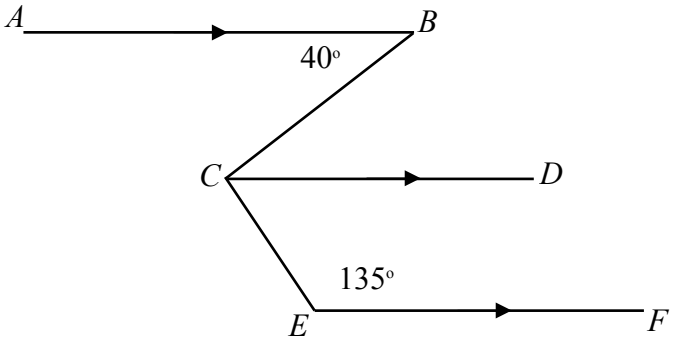
8 In the diagram, AB is parallel to CD and EF. Angle $ABC = 40°$ and angle $CEF = 135°$.



Calculate angle BCE.

Answer ..... ° [2]

---

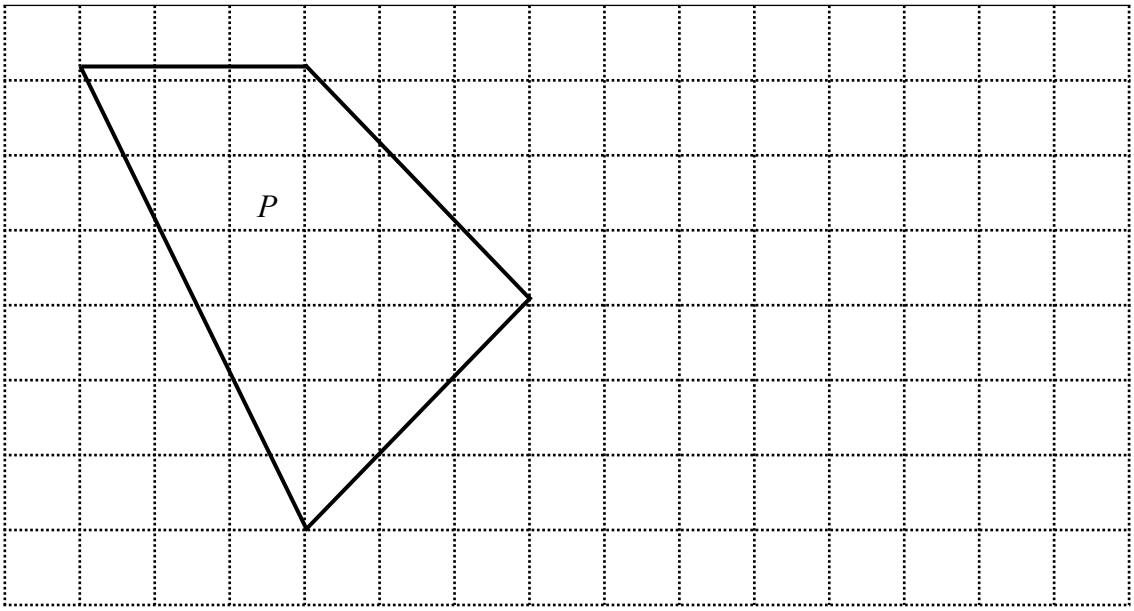
9 **(a)** $\sin m° = 0.6$
Given that m is an obtuse angle, find m.

Answer $m =$ ..... [1]

(b) $\cos 133° = -\cos n°$
Given that n is an acute angle, find n.

Answer $n =$ ..... [1]

10 On the grid below, draw a reduction of figure *P* using a scale factor of $\frac{1}{3}$.



[2]

11 A car is travelling at a constant speed of 90 km/h.

(a) How many minutes does the car take to travel 105 km?

Answer ..... minutes [2]

(b) Convert 90 km/h to m/s.

Answer ..... m/s [1]

---

12 In 2021, Jane's annual salary was $22 140.
This was an increase of 2.5% on her annual salary in 2020.

(a) Calculate her annual salary in 2020.

Answer $ ..... [2]

(b) The income tax rates for 2021 were:

Chargeable Income	Income Tax Rate (%)	Gross Tax Payable ($)
First $20 000	0	0
Next $10 000	2	200

(Source: www.iras.gov.sg)

Calculate the amount of income tax she paid in 2021.

Answer $ ..... [1]

---

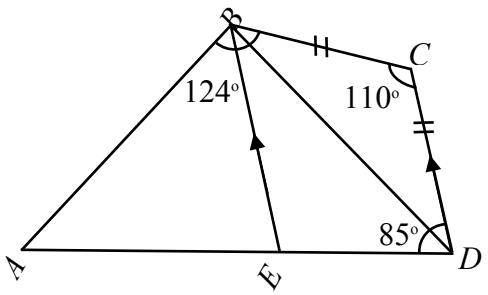
13 Express $\frac{5}{x^2-9}+\frac{1}{x+3}$ as a single fraction, in its simplest form.

Answer ..... [3]

---

14 $ABCD$ is a quadrilateral and E is a point on AD. $BC = CD$ and BE is parallel to CD.

Angle $ABC = 124°$, angle $BCD = 110°$ and angle angle $CDA = 85°$.



(a) Find angle BAD.

Answer ..... ° [1]

(b) Find angle BDE.

Answer ..... ° [2]

---

15 **(a)** Jerry deposits \$60 500 in a bank at 1.2% per annum interest for 3 years.

Calculate the simple interest earned for 3 years.

Answer \$ ..... [1]

(b) Tom invests \$12 000 for 4 years.
He receives compound interest at 1.15% per year.
How much is the investment worth at the end of the four years?
Give your answer to the nearest cent.

Answer $ ..... [2]

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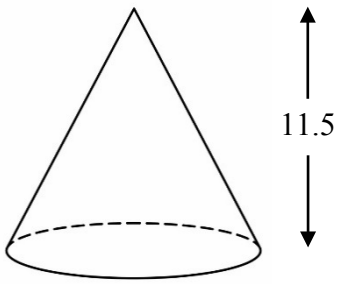
16 A cone has a vertical height of 11.5 cm, radius r cm and volume 434 cm^3.



Calculate r.

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

---

17 The scale of the map is 1 : 40 000.

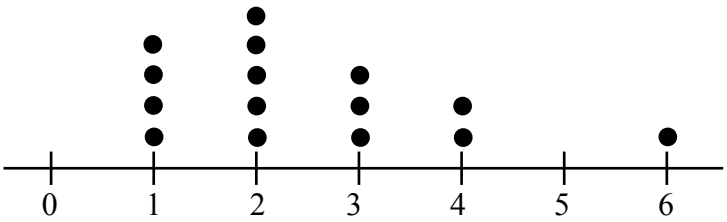
(a) The distance between two police stations on the map is 35 cm.
Find the actual distance. Give your answer in kilometres.

Answer ..... km [2]

(b) The area of a forest has an area of 4.8 km^2.
Calculate the area of the forest on the map. Give your answer in cm^2.

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

18 This dot diagram shows the number of hours some boys spent on social media in a particular week.



number of hours

(a) How many boys are there?

Answer ..... boys [1]

(b) Find the mode.

Answer ..... hours [1]

(c) Find the number of boys who spent 2 hours on the social media in the week.

Answer ..... boys [1]

(d) If a boy is selected at random, find the probability that the boy spent more than 3 hours on the social media in the week.

Answer ..... [1]

19 **(a)** $x^2 - 6x - 11 = (x + h)^2 + k$

Find h and k.

Answer $h =$ ..... $k =$ ..... [2]

(b) Hence, solve $x^2 - 6x - 11 = 0$.
Give your answers correct to 2 decimal places.

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

2 0 A fruit stall sells mangoes at \$$m$ each and nectarine at \$$n$ each.

(a) 6 mangoes and 3 nectarines cost \$7.50.
Show that $2m + n = 2.5$.

Answer

[1]

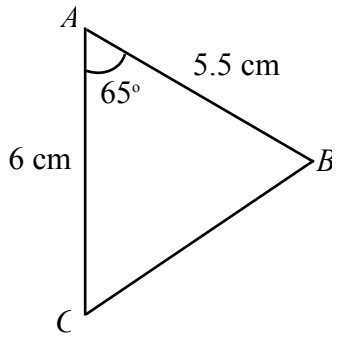
(b) 4 mangoes and 7 nectarines costs \$8.50
Form another equation and hence solve the simultaneous equations algebraically.

Answer $m =$ .....

$n =$ ..... [3]

.....

2 The diagram shows a sketch of triangle ABC.
1



(a) Construct an accurate full-sized drawing of triangle ABC.
The side AC has been drawn for you.

[2]

(b) Construct the bisector of angle BCA. [1]

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

(d) Given that the two bisectors meet at P, measure AP.

Answer $AP =$ ..... cm [1]

.....

2 The length of the rectangular playground is x metres.
2

The breadth of the playground is $(x+6)$ metres.
The area of the playground is 40 m^2.

(a) Write down an equation in x to represent this information and show that it reduces to $x^2+6x-40=0$.

Answer

[1]

(b) Solve the equation $x^2+6x-40=0$.

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

(c) Hence, find the perimeter of the playground.

Answer ..... m [1]

(d) Explain why one of the values of x is rejected.

Answer .....

..... [1]

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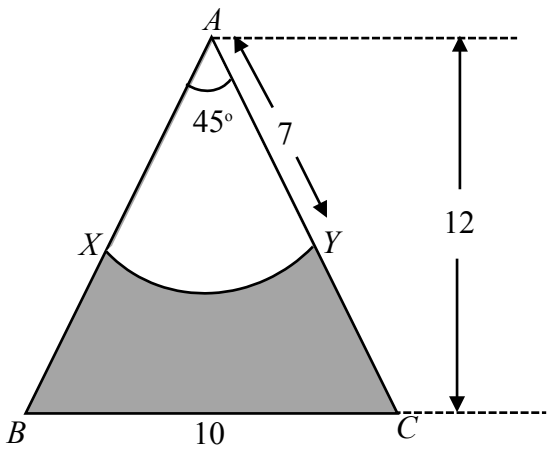
2 *AXY* is a sector of a circle, centre *O*, of radius 7 cm and angle $BAC = 45°$.

3 *ABC* is an isosceles triangle with a height of 12 cm and *BC* = 10 cm.



Calculate the percentage of the triangle that is shaded.

Answer ..... % [5]

---

2 4 **(a)** The n^{th} term of a sequence is given by $13 - 2n$.

Write down the first two terms of the sequence.

Answer ....., ... [1]

(b) The first four terms of a different sequence are

15, 19, 23, 27.

(i) Find an expression for the n^{th} term of this sequence.

Answer ..... [1]

(ii) Find the 15^{th} term.

Answer ..... [1]

(iii) The p^{th} term in the sequence is 259.

Find p.

Answer $p =$ ..... [2]

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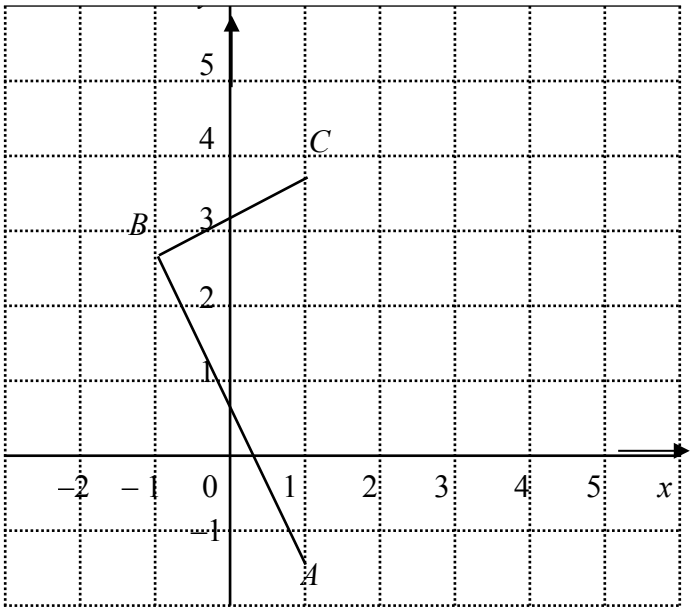
2 5 The points $A(1, -1)$, $B(-1, 3)$, $C(1, 4)$ and D are the vertices of kite $ABCD$.



(a) Find the equation of line BC.

Answer ..... [3]

(b) Find the coordinates of the point D.

Answer D (..... , ...) [1]

(c) Tim claims that the length of line AB is 7.47 units.
Is he correct? Explain your answer.
Answer

[2]

END OF PAPER
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