Class Register No.

Candidate Name

PEIRCE SECONDARY SCHOOL
PRELIMINARY EXAMINATION 2024
SECONDARY 4 NORMAL ACADEMIC

MATHEMATICS **4045/01**
Paper 1 **31 July 2024**
2 hours

Additional Materials:
Plain Paper (for rough work)

INSTRUCTIONS TO CANDIDATES
Candidates answer on the Question Paper. Write your name, class and register number on all the work you hand in. Write in dark blue or black pen. You may use a 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 . The number of marks is given in brackets [ ] at the end of each question or part question. The total of the marks for this paper is 70.

	For Examiner's Use	
PARENT'S SIGNATURE	**Total**	

This paper consists of **18** printed pages and 0 blank page.
Setter: Mr Goh

Mathematical Formulae

Compound interest

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

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

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

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

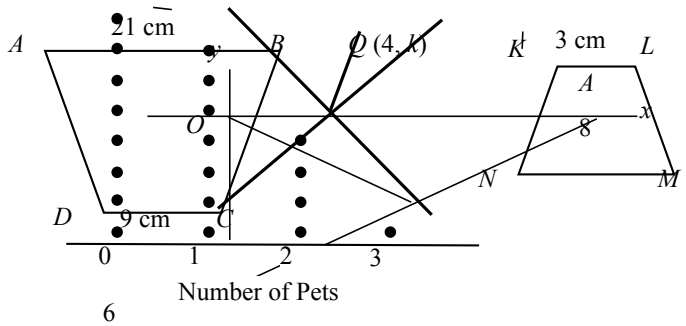
Statistics

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

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

Answer **all** the questions.

1 The spinner in the diagram has an equal chance of landing on each of the numbers 1, 2, 3, 4, 5, 6, 7 and 8.



Find the probability that the spinner lands on

(a) a prime number,

Answer …….. [1]

(b) a number more than 3.

Answer …….. [1]

2 Find the obtuse angles A and B such that

(a) $\sin A = 0.65$,

Answer ……..° [1]

(b) $\cos B = -0.2$.

Answer …….. rad [1]

3 By writing each value correct to 1 significant figure, estimate the value of $\sqrt{\frac{2.24 \times 19.8}{9.83}}$ without the use of calculator. Show all workings clearly.

Answer ….……...……...……..... [2]

4 Arrange the following numbers in descending order.

$\dot{9.2}$ 2.1^3 3π

9.22

Answer …..…...……..……..……..... [2]

5 Trapezium *NMLK* is a reduction of trapezium *ABCD*.

(a) Find the length of *NM*.

Answer ……...cm [1]

(b) Write down the scale factor for the reduction of trapezium *ABCD* to trapezium *NMLK*.

Answer ..... [1]

6 Expand and simplify $(2y+4)(y-5)$.

Answer ..... [2]

7 Solve the equation $\frac{p+3}{9}+\frac{2p}{15}=-2$.

Answer ..... [2]

8 The first 3 terms of a sequence are 58, 51, 44.

(a) Find the next 2 terms.

Answer ……..……..……..……..... [1]

(b) Find the *n*th term of the sequence.

Answer ……..……..……..……..... [1]

(c) Determine if -4 is in the sequence. Show all workings clearly.

Answer

[2]

9 **(a)** Solve the inequality $10-2y \leq 18$.

Answer ……..……..……..……..... [2]

(b) Find the smallest integer that satisfy $10-2y \leq 18$.

Answer ……..……..……..……..... [1]

10 Make g the subject of the formula $t=\sqrt{2g-h}$.

Answer …..…..……..…….....[3]

11 $x^2 + 6x - 17$ can be written as $(x + a)^2 + b$, where a and b are constants.

(a) Find a and b.

Answer a = ……..……., b = ..…….....[2]

(b) Hence, solve the equation $x^2 + 6x - 17 = 0$, leaving your answers to 3 decimal places.

Answer …… [2]

12 The diagram below shows the graph of $y = x(x - 4)$. The graph passes through the x-axis at $A(0, 0)$ and $B(k, 0)$.

(a) State the value of k.

Answer ..... [1]

(b) Find the equation of the line of symmetry.

Answer ..... [1]

(c) Find the coordinates of the minimum point of the graph.

Answer ..... [1]

13 The following shows the sketch of a parallelogram *PQRS*.

(a) Complete the construction of the parallelogram. *PQ* has already been drawn for you.

[2]

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

(d) Construct the angle bisector of angle

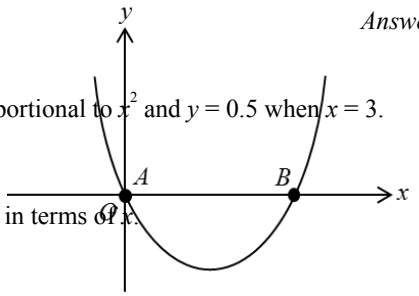
PQR. [1]

(e) The perpendicular bisector of *SR* intersects the angle bisector of *PQR* at point *Y*.

Measure the length *QY*.

Answer ……cm [1]

14 *y* is inversely proportional to x^2 and $y = 0.5$ when $x = 3$.



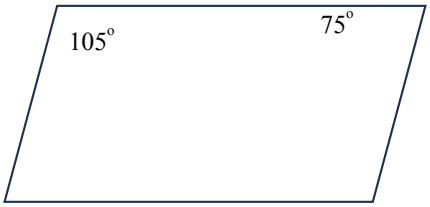
(a) Express *y* in terms of *x*.

Answer …… [2]

(b) Find the value of *y* when $x = -2$.

Answer …… [1]

(c) Find the value(s) of *x* when $y = 8$.



Answer …….…… [2]

15 White gold is commonly used as jewellery. It is a mixture of three metals, namely gold, palladium and nickel, in the ratio of 14 : 2 : 3.

(a) A white gold necklace weighs 10.45 g. Calculate the mass of nickel in the necklace.

Answer ……g [1]

(b) By referring to the table below, calculate the cost of white gold used to make the necklace, giving your answer to the nearest dollar.

White Gold	Cost per gram
Gold	$135.00
Palladium	$29.42
Nickel	$0.04

Answer $…… [2]

16 A map is drawn to the scale of 1 : 50000.

(a) The length of a road is 11.5 cm on the map. Find the actual length of the road.

Answer ……km [2]

(b) The actual area of a neighourhood is 4 km^2. Find the area of the neighbourhood on the map.

Answer ……cm^2 [2]

17 In the following sector, the angle subtended at centre O is 70^{o} and the radius is 8 cm.

(a) Find the perimeter of the sector. Leave the answer in the form $a + b\pi$,where a and b are constants.

Answer ……cm [2]

(b) Find the area of the shaded segment.

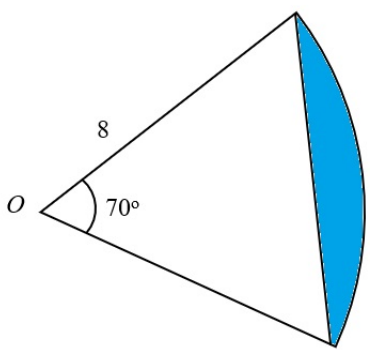
Answer ……cm^2 [3]

18 Draw an enlargement of the polygon using the scale factor of 2.

[2]

19 **(a)** The $y + c$, where b is the gradient

and c is th



Answer $b =$ ……, $c =$…… [2]

(b) In the diagram, the points A and B are on the x–axis and y–axis respectively. The point Q (4, k) lies on the line AB.

(i) Find the equation of the line AB.

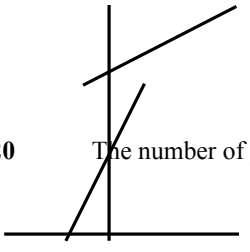
Answer ……..[2]

(ii) Find the value of k.

Answer ……..[1]

(iii) Hence, find the length of BQ.

Answer ……..units [2]



20 The number of pets in 20 families surveyed is shown in the dot diagram.

(a) Find the mode.

Answer ……..[1]

(b) Find the median.

Answer ……..[1]

(c) Find the percentage of families which have more than 1 pet.

Answer ……..[2]

21 **(a)** A ladder of 5 m is placed against a vertical wall. The foot of the ladder is 1.2 m from

the base of the vertical wall. The safe working angle for a ladder is between 70^{o} and 74^{o} to the horizontal. Is the ladder in a safe position ?

Explain your answer with clear workings.

5

1.2

Answer

[2]

(b) Show, with clear workings, whether triangle *ABC* is a right angled triangle**.**

The diagram is not drawn to scale.

Answer

[2]

End of Paper