

HUA YI SECONDARY SCHOOL PRELIMINARY EXAM 2024 4-G2

NAME		
CLASS	INDEX NUMBER	

MATHEMATICS PAPER 1

4045/01

31 July 2024

2 hours

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your Name, Class and Index Number in the spaces provided at the top of this page. Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, 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 of the marks for this paper is 70.

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 your answers in degrees to one decimal place. For π , use either your calculator value, or 3.142.

For Exam	niner's
Use	
	70
	70

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Setter: Ms Shirlynn Khoo

Mathematical Formulae

Compound interest

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

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

Answer	<i>x</i> =	[2]
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$\frac{\pi}{5}$	0.6	$\frac{5}{8}$	0.60
5		0	

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

3 (a) Write 0.000845 in standard form.

(b) $(2.5 \times 10^{m}) \times (4.9 \times 10^{n}) = a \times 10^{b}$ where $1 \le a < 10$. [1]

(i) Find the value of *a*.

Answer a = [1]

(ii) Write an expression for b in terms of m and n.

Answer $b = \dots$ [1]

2024_4-G2_PRELIMS_ MATHEMATICS _PAPER 1

4 By writing each number correct to 1 significant figure, estimate the value of

$$\sqrt{\frac{5.9\times24.2}{0.333}}.$$

5 The diagram below shows an incomplete figure made up of a regular pentagon Y and another regular polygon X of n sides.



(a)	Complete pentagon <i>Y</i> .		
	Answer shown in diagram above	[2]

(b) Find the value of *n*. Show your working clearly.

6 (a) Write $\frac{1}{x-5} + \frac{1}{x^2-25}$ as a single fraction in its simplest form.

(b) Rearrange this formula to make *h* the subject.

$$a = \frac{1}{3}(h+k)b$$

7 Mary scored 65 marks in her English test, 60 marks in her Science test and *x* marks in her Mathematics test, where *x* is an integer. The full mark for each test is 100 and she only takes these three subjects. Mary claims that her mean test score can be at least 80 marks.

(a) Form an inequality involving x and that represents Mary's claim.

(b) Determine whether Mary is correct in her claim. Show your working. *Answer*

8 (a) ABC is a triangle with BC = 7 cm and $\angle CAB = 50^{\circ}$. Construct triangle ABC. AB has been drawn for you.

A ______ B

(b)	Construct the angle bisector of $\angle CAB$.	[1]
(c)	Construct the perpendicular bisector of <i>AB</i> .	[1]
(d)	<i>X</i> is the point where the angle bisector of $\angle CAB$ meets the perpendicular bisector of <i>AB</i> . Measure <i>CX</i> .	

[2]



The graph below shows a line segment PQ which cuts the y-axis at R.

(a) Find the gradient of *PQ*.

(b) Hence find the equation of the line *PQ*.

(c) Write down the coordinates of *R*.

Answer (.....) [1]

(d) A line, *l*, is parallel to *PQ* and passes through the point S(4, -5). Find the equation of *l*.

10 Simplify the following expressions.

(a)
$$\frac{x}{4} - \frac{2(x-3)}{5}$$
,
(b) $\frac{10x^2y}{3y} \div \frac{8x}{15}$.
Answer

- 11 A building can be completed in 120 days with 50 workers. Assuming that all the workers work at the same rate, find
 - (a) the number of days it takes to complete the building with 20 workers,

Answer days [1]

(b) how many more workers are required to complete the building in 100 days.

[Turn Over

[2]

12	(a)	An expression for the <i>n</i> th term of a sequence is $10-3n$.
		Find the 20 th term of the sequence.

(b) The first four terms of a sequence are

-1, 3, 7, 11.

(i) Find an expression for the *n*th term in this sequence.

(ii) Is 121 a term in this sequence? Explain your answer. [2]

Answer

13 Ten years ago, item *A* cost \$8. It was then increased by 200% from its original price. Two months ago, there was a discount of 8% for item *A*. Today there is a further reduction of price by 2%. How much does item *A* cost today?

Answer \$ [3]

9

14 There are two numbers, x and y. When the second number is subtracted from twice the first number, the result is 18. When 9 is added to the first number, the result is equal to twice the second number.

(a) Write down a pair of simultaneous equations to represent the information above.

Answer

.....[2]

(b) Solve the simultaneous equations in (a). Find x and y.

Answer $x = \dots$

 $y = \dots$ [2]



Figures X and Y are similar, with all the lengths given in centimetres.

(a) Figure *Y* is an enlargement of Figure *X*. Find the scale factor.

(b) Find the value of *a*.

Answer $a = \dots$ [1]

2024_4-G2_PRELIMS_ MATHEMATICS _PAPER 1

16 (a) Given that $x^2 - 6x - 20 = (x+a)^2 + b$, find the value of a and of b.

(b) Hence solve $x^2 - 6x - 20 = 0$, giving your answer to 2 decimal places.

Answer $x = \dots$ [2]



2024_4-G2_PRELIMS_ MATHEMATICS _PAPER 1

18 (a) Given that x is an obtuse angle, solve $\sin x = 0.75$.



The diagram shows a circle, centre *O*, of radius 8cm. The line *AC* is perpendicular to the radius *OA*, and the line *OC* intersects the circle at *B*. Given that $\angle OCA = 0.5$ radians, calculate the area of the shaded region.

19 A die was thrown x times. The frequency of the results were recorded.

Score on die	1	2	3	4	5	6
Frequency	а	3	2	4	6	6

(a) Write down the smallest possible value of *a* given that the mode is 1.

Answer a = [1]

(b) Write down the smallest possible value of *a* given that the median is 4.

Answer a = [1]

(c) Calculate the value of *a* given that the mean is 3.92.

Answer $a = \dots$ [2]

(d) Calculate the standard deviation if a = 2.

Answer [1]

End of Paper

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