CHUNG CHENG HIGH SCHOOL (YISHUN)

NA

2023 Preliminary Examination
Secondary Four Normal Academic

CANDIDATE NAME

CLASS

INDEX NUMBER

MATHEMATICS SYLLABUS A

4045/01

Paper 1

27 July 2023

2 hours

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number on the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use 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 in the space below the question.
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.

You are reminded of the need for clear presentation in your answers.
Up to 2 marks may be deducted for improper presentation.

Question Number	Marks	Marks Obtained
1	2	
2	3	
3	2	
4	5	
5	4	
6	3	
7	6	
8	5	
9	3	
10	4	
11	3	
12	3	
13	3	
14	3	
15	3	
16	1	
17	3	
18	4	
19	6	
20	4	
TOTAL	**70**	

Mathematical Formulae

Compound Interest

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

Measurement

$$\text{Curved surface area of a cone} = \pi rl$$

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

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

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

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

$$\text{Arc length} = r\theta, \text{ where } \theta \text{ is in radians}$$

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

Trigonometry

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

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

Statistics

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

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

Answer all the questions

1 $\frac{7}{2}$ $\quad 330\%$ $\quad \frac{\pi}{2}$ $\quad 0.325$ $\quad \frac{12}{15}$

Write these numbers in descending order.

Answer: ……, ……, ……, ……, …… [2]

2 **(i)** Solve $-4x - 6 \leq -21$ and represent your answer on a number line.

[2]

(ii) Hence, find the smallest integer that satisfies $-4x - 6 \leq -21$.

Answer: …… [1]

3 **(a)** Sarah mixes 0.4 kg of flour with 250 g of butter.
Write the ratio of butter : flour in its simplest form.

Answer: …… **:** …… [1]

(b) A bag contains only blue and pink bean bags.

$\frac{3}{11}$ of the bean bags are pink.

Write the ratio pink bean bags : blue bean bags in its simplest form.

Answer: …… **:** …… [1]

4 **(a)** Write 628 as a product of its prime factors.

Answer: ..... [1]

(b) Find the largest perfect square that is a factor of 600.

Answer: ..... [2]

(c) $280 = 2^3 \times 5 \times 7$

Find the lowest common multiple (LCM) of 280 and 600. Give your answer as a product of its prime factors.

Answer: ..... [1]

(d) Find the smallest positive integer of x such that $600x$ is a perfect cube.

Answer: ..... [1]

5 **(a)** Given that $v = \frac{d^2}{2} - a$, find the value of v when $a = 5$ and $d = -8$.

Answer: ..... [2]

(b) Make d the subject of the formula $v = \frac{d^2}{2} - a$.

Answer: $d =$ ..... [2]

6 Simplify $\frac{(5ad)^2}{x} \times \frac{a}{6} \div \frac{d^3}{2^0}$.

Answer: ..... [3]

7 **(i)** Sheldon wanted to invest \$18 000 in a saving plans with a compound interest of 5% half yearly for 4 years in Bank A. Calculate the total interest that he received at the end of the 4 years.

Answer: \$…… [3]

(ii) Sheldon is also thinking of investing in Bank B with the same amount of \$18 000 and the same duration of 4 years. However, Bank B charged a simple interest rate at 6% per annum. Which bank should Sheldon invest in? Explain your answer.

Answer: Bank ……

This is because ……...……

……..……...……

……..…… [3]

8 Expand and simplify

(i) $2(c+p)-(-7p+4c)$,

Answer: ..... [2]

(ii) $(5x-2)(2x+3)-2(5x-3)(x+1)$.

Answer: .....[3]

9 **(i)** Expand $p^2-(p+a)(p-a)$.

Answer: ..... [2]

(ii) Hence, write down the value of $123456^2-(123459)(123453)$.

Answer: ..... [1]

10 $x^2 - 16x + 8 = (x - a)^2 + b$

(a) Find the value of a and of b.

Answer: a = ……

b = …… [2]

(b) Hence, solve $x^2 - 16x + 8 = 0$, giving your answers correct to 2 decimal places.

Answer: x = …… or x = …… [2]

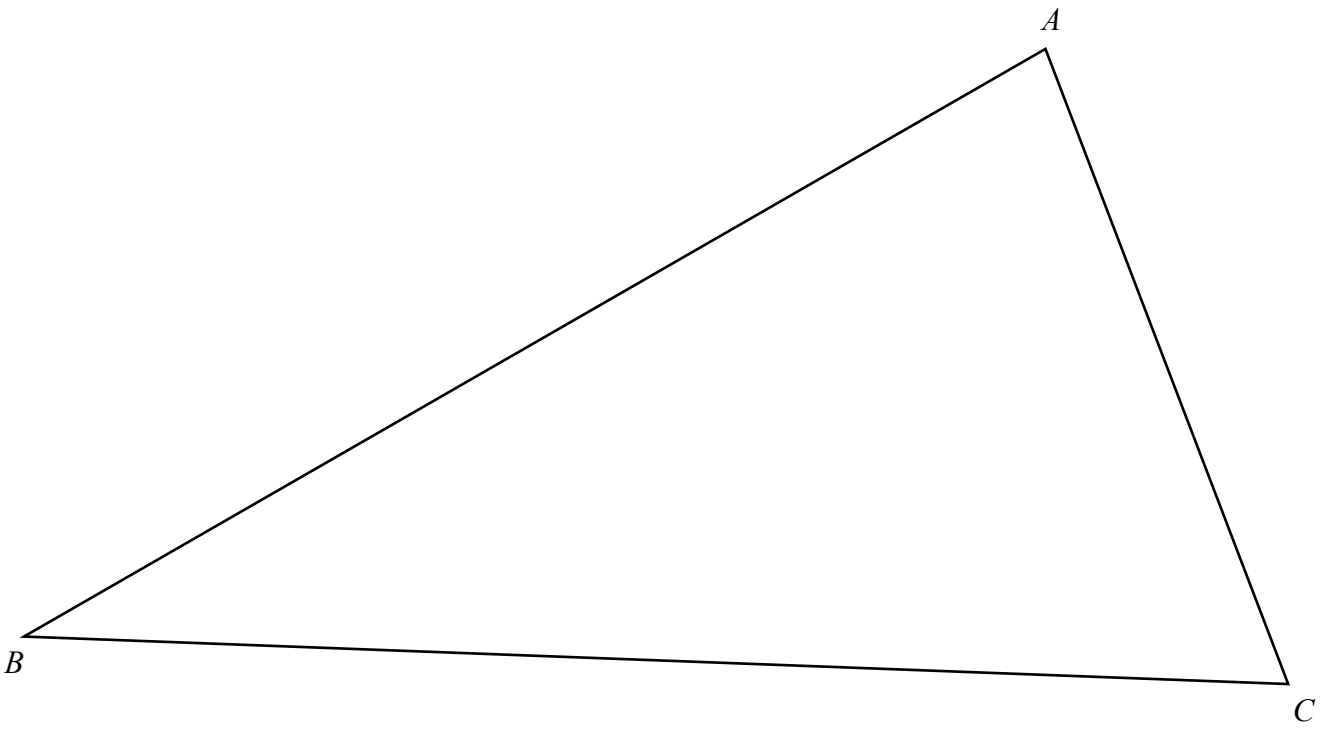
11 Janelle travelled from Singapore to Thailand. She exchanged 400 Singapore dollars ($) into Thai Baht (THB) when the exchange rate was 1 THB = $0.03875. While in Thailand, she spent 6500 THB. On her return, she exchanged her remaining Thai Baht when the exchange rate was 1 THB = $0.03765. How much Singapore dollars did she receive?

Answer: $…… [3]

12 Point E is on the intersection point of the bisector of angle ACB and perpendicular bisector of BC.

(a) Use only ruler and compass to locate and label E in the answer space below. [2]

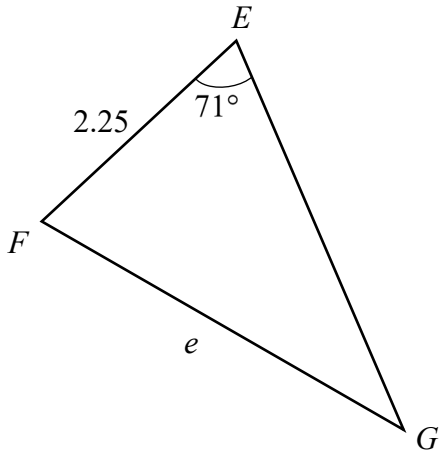
Answer:

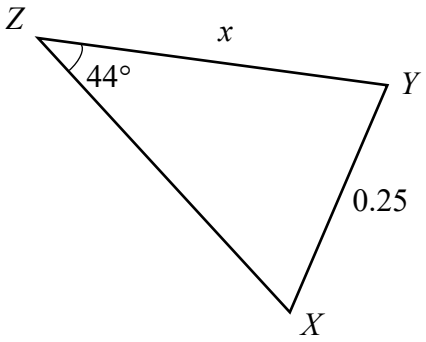


(b) Measure BE.

Answer: …… cm [1]

13 *EFG* and *XYZ* are similar triangles with all the lengths given in cm.





(a) Find $\angle EFG$.

Answer: ..... [1]

(b) Triangle *EFG* is an enlargement of triangle *XYZ*. Find the scale factor.

Answer: ..... [1]

(c) Hence, find x in terms of e.

Answer: ..... [1]

14 The y-intercept of the line $ky - 5x + 14 = 0$ is -2. Find

(a) the value of k.

Answer: $k =$ …… [2]

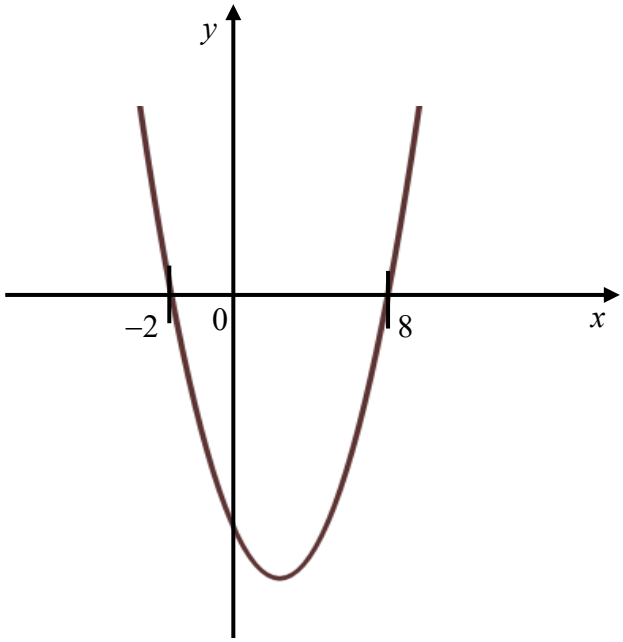
(b) the gradient of the line.

Answer: …… [1]

15 There are three points X (1, 8), Y (3, m) and Z (–1, 13). If $XY = XZ$, find the value of m where $m > 5$.

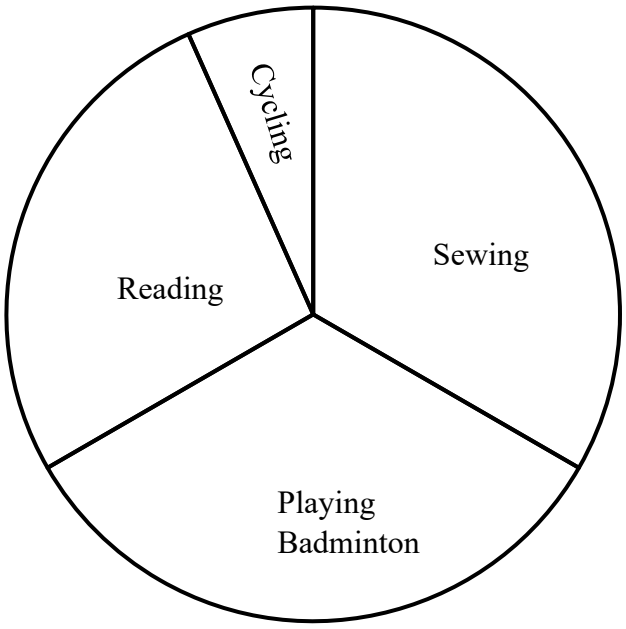
Answer: $m =$ …… [3]

16 State the equation of the line of symmetry of the following quadratic curve.



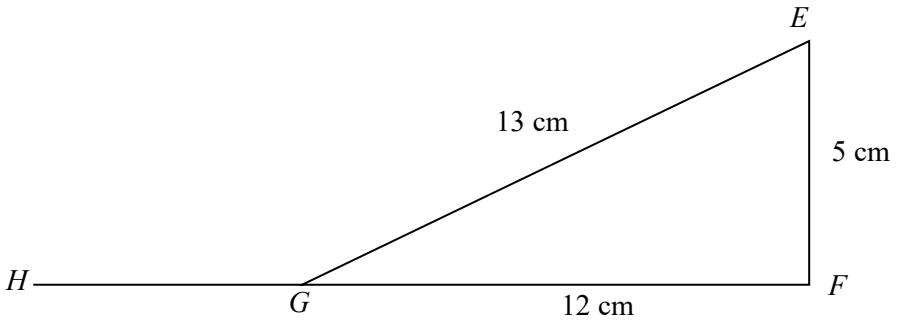
Answer: $x =$ …… [1]

17 A group of elderly were asked for their favourite hobby. The results are summarised in the accurate pie chart below. The number of elderly who like reading is 50 more than the number of elderly who like cycling. Find the total number of elderly in the group.



Answer: …… [3]

18 In the figure, EF and FG are straight lines. It is also given that $EF = 5$ cm and $EG = 13$ cm.



(a) Showing clearly your working steps, determine whether triangle EFG is a right-angled triangle.

Answer: ……...

……

……

……

……

……

……

……... [2]

(b) Expressing your answer as a fraction, write down

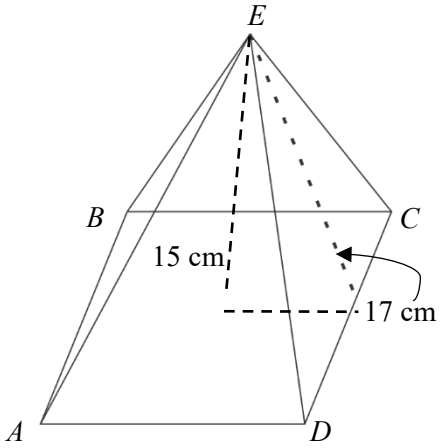
(i) $\sin \angle FEG$,

Answer: $\sin \angle FEG =$ …..……...…… [1]

(ii) $\cos \angle EGH$.

Answer: $\cos \angle EGH =$ …..……...…… [1]

19 The diagram shows a candle in the shape of a pyramid *ABCDE.* The slant height of the surface is 17 cm and the vertical height is 15 cm.



(a) Explain why the base length of the pyramid is 16 cm.

Answer: [2]

(b) Calculate the volume of the pyramid.

Answer: ……..……...…… cm^3 [2]

(c) The candle is melted and reshaped into a sphere with diameter 4 cm. Find the maximum number of spheres that can be formed.

Answer: ……..……...…… [2]

20 The stem-and-leaf diagram below represents the mass of 30 boys and girls in class 2 Respect.

Leaf for boys	**Stem**	**Leaf for girls**
8	3	5 6
7 2	4	4 8 9
8 5 6 2	5	0 0 1 2 5 7 9
4 7 5 2 2 0	6	2 5
5 1	7	3

Key (Boys): 2|5 represents 52 kg

Key (Girls): 5|0 represents 50 kg

(a) Find the modal mass of the girls.

Answer: …….. kg [1]

(b) Find the median mass of the boys.

Answer: …….. kg [1]

(c) A girl who was previously absent has her mass measured as 55 kg. Explain with calculations whether this new data will have any effect on the median mass for the girls.

Answer: .....……...……...……

……...……..

……...……..

…… [2]

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