

聖嬰中學

HOLY INNOCENTS' HIGH SCHOOL

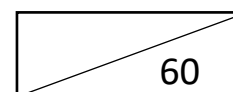


Candidate Name

Class

Index Number

END OF YEAR EXAMINATION 2022
SECONDARY 2
MATHEMATICS PAPER 1



4052/01

Date: 6 Oct 2022

Duration: 1 h 30 min

Candidates answer on the Question Paper.
No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number on all 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 tape/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 **60**.

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.

For Examiner's use

You need to improve on your:

• **PRESENTATION**

• **ACCURACY**

Marks (max 5%)

Set by: Mr Lin WeiDing

Vetted by: Mr Shahrom

Mathematical Formulae*Mensuration*

Curved surface area of a cone = $\pi r l$

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

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

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

Answer **all** the questions

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

$$\frac{1}{2} \quad \sqrt{1} \quad 10\% \quad \pi \quad (0.1)^2$$

Answer [2]
smallest *largest*

- 2** The number of National Day Parade 2022 participants were estimated to be 26000, corrected to 2 significant figures.

Find

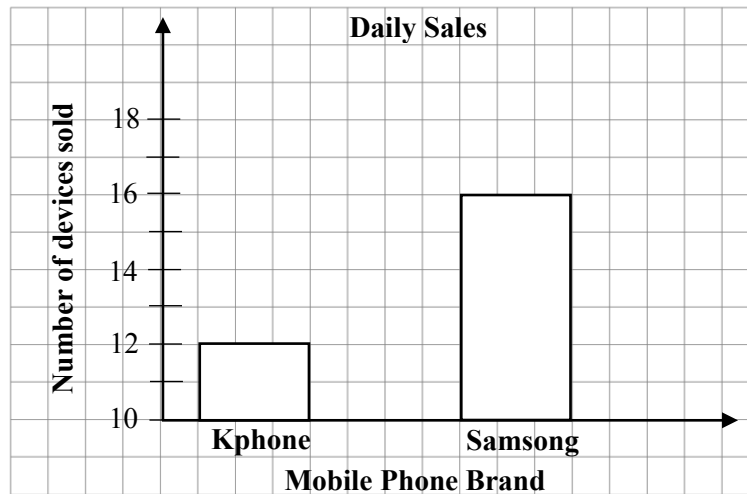
- (a)** the largest possible number of participants,

Answer [1]

- (b)** the smallest possible number of participants.

Answer [1]

- 3 A graph showing the daily sales for two mobile phone brands is shown below.



State one feature of the graph that may be misleading and explain why.

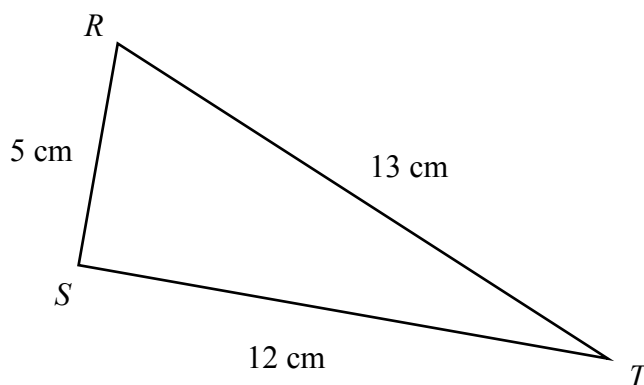
Answer

 [2]

- 4 Solve the equation $(2x + 7)(x + 3) = 15$.

Answer $x =$ [3]

- 5 In the diagram, $RS = 5$ cm, $ST = 12$ cm, and $RT = 13$ cm.



Is triangle RST a right-angled triangle? Show your working.

Answer

.....

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..... [2]

- 6 (a) Solve the inequality $\frac{3x-2}{4} < 5$.

Answer [2]

- (b) Hence write down the largest integer that satisfies the inequality in **part (a)**.

Answer $x =$ [1]

7 It is given $\frac{2a+b}{q} = M$.

(a) Express a in terms of M , q and b .

Answer $a = \dots\dots\dots$ [2]

(b) Find the value of M when $a = -1.75$, $b = -3$ and $q = 0.5$.

Answer $M = \dots\dots\dots$ [1]

8 Jaclyn bought a smartwatch in Korea that cost 234000 Korean won.
She pays GST at 7% on the cost of the smartwatch when she returned to Singapore.

The exchange rate between Singapore dollars and Korean won is \$1 = 937.30 won

Calculate the amount, to the nearest dollar, Jaclyn spent on the smartwatch including GST.

Answer \$ $\dots\dots\dots$ [3]

9 Solve the simultaneous equations

$$3x - 2y = 5,$$

$$4x - 5y = 2.$$

Answer $x = \dots\dots\dots$

$y = \dots\dots\dots$ [3]

- 10** There were 12 girls and 8 boys in a Tennis club in Term 1.
One person was selected at random to participate in a competition.

(a) Find the probability of selecting a boy for the competition.

Answer [1]

- (b)** In Term 2, a few more girls joined the Tennis club and the probability of selecting a girl became $\frac{9}{13}$.

Find the number of girls who joined the Tennis club in Term 2.

Answer girls [2]

- 11 (a)** Written as products of their prime factors, $L = 2^a \times 3^b \times 7^c$ and $108 = 2^2 \times 3^3$.
 The highest common factor of L and 108 is $2^2 \times 3^2$.
 The lowest common multiple of L and 108 is $2^3 \times 3^3 \times 7$.
 Find the value of a , b and c .

Answer $a = \dots\dots\dots$ [1]

$b = \dots\dots\dots$ [1]

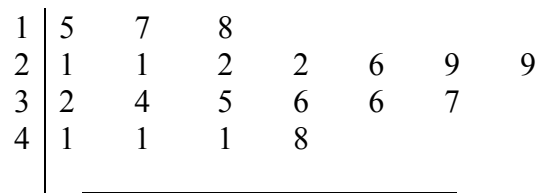
$c = \dots\dots\dots$ [1]

- (b)** Explain why 108 is not a square number.

Answer

 [1]

- 12 The marks for 20 students are shown in the stem-and-leaf diagram.



Key	
3 1	means 31

- (a) Find

- (i) the modal mark,

Answer mark [1]

- (ii) the median mark,

Answer mark [1]

- (b) Calculate the percentage of students who scored more than 25 marks.

Answer % [1]

- (c) Explain why a pictogram is not suitable to represent the above data.

Answer

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..... [1]

- 13** A map is drawn to a scale of 1 : 20 000.
The distance on the map between two buildings is 3.5 cm.

(a) Calculate the actual distance, in kilometres, between the two buildings.

Answer km [2]

One of the building covers an area of 0.35 km^2 .

(b) Find the area, in square centimetres, covered by the building on the map.

Answer cm^2 [2]

14 (a) The first five terms of a sequence are $\frac{1}{1}, \frac{3}{4}, \frac{5}{9}, \frac{7}{16}, \frac{9}{25}$.

(i) Write down the next term in this sequence.

Answer [1]

(ii) Find an expression T_n , in terms of n , for the n^{th} term in this sequence.

Answer $T_n =$ [1]

(b) The n^{th} term in a different sequence is given by $7n - 3$.

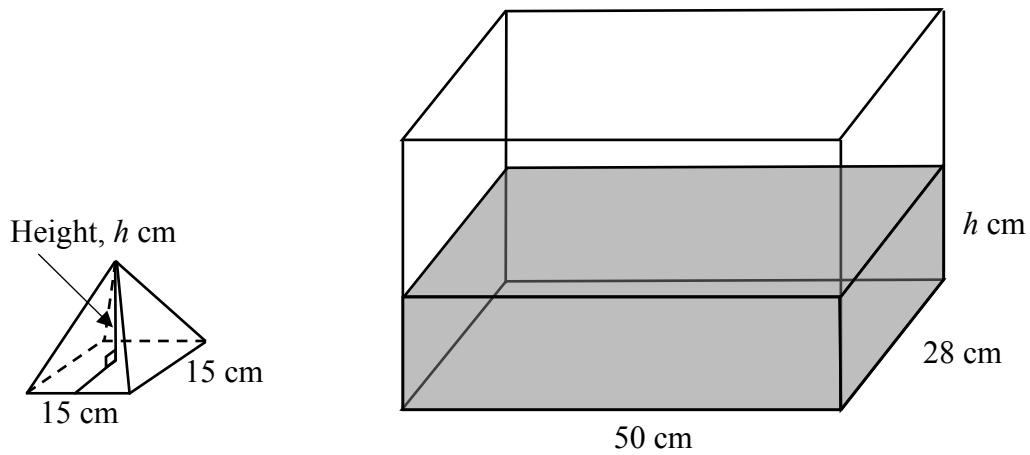
Explain if 520 is a term in this sequence.

Show all your working.

Answer

 [2]

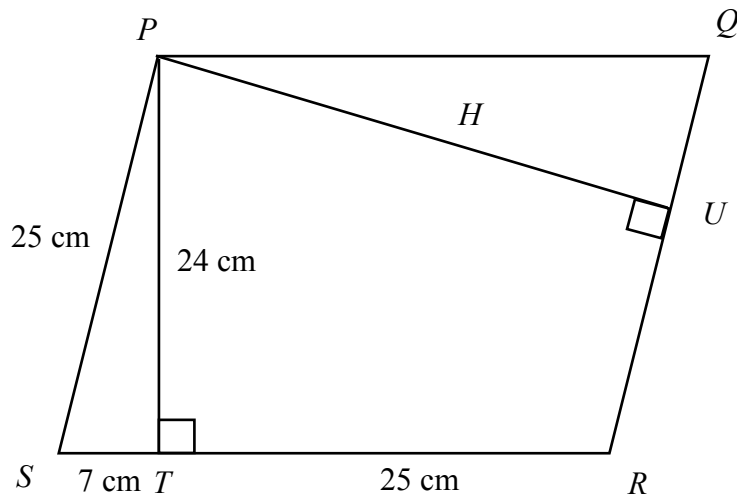
- 15 A solid pyramid has a square base of side 15 cm and a height of h cm.
A tank with a base measuring 50 cm by 28 cm contains water to a depth of h cm.



The pyramid is placed into the tank such that it is fully submerged in water.
Find the percentage increase in the depth of water.

Answer % [4]

- 16 In the figure, $PQRS$ is a parallelogram with height H .
 PT is perpendicular to SR and PU is perpendicular to QR .
 $PT = 24$ cm, $PS = 25$ cm. $ST = 7$ cm and $TR = 25$ cm.



Find

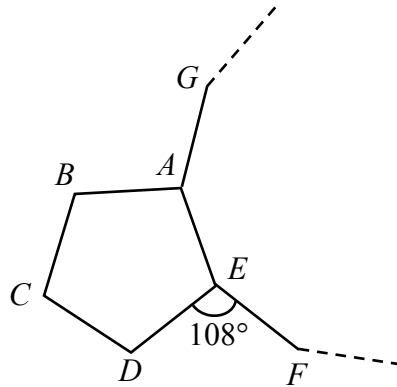
- (a) the value of H ,

Answer cm [2]

- (b) the ratio of area of triangle PST : area of parallelogram $PQRS$.

Answer : [2]

- 17 The diagram shows a regular pentagon $ABCDE$.
 AG , AE and EF are three sides of another regular polygon of n side.
 Angle $DEF = 108^\circ$.



Find

- (a) angle AED ,

Answer $^\circ$ [2]

- (b) angle AEF ,

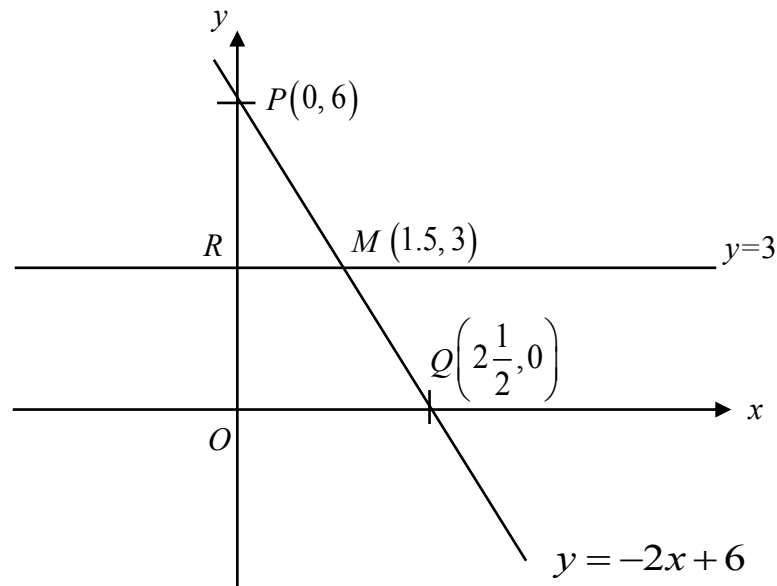
Answer $^\circ$ [1]

- (c) the value of n .

Answer $n =$ [2]

- 18 A line $y = -2x + 6$ intersects the y -axis at $P(0, 6)$ and the x -axis at $Q\left(2\frac{1}{2}, 0\right)$.

Another line $y = 3$ intersects the line $y = -2x + 6$ at $M(1.5, 3)$ and the y -axis at R .



- (a) Write down the coordinates of R .

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

- (b) Find the area of trapezium $ORMQ$.

Answer units² [2]

- (c) Find angle PQO .

Answer ° [2]

End of Paper

ONE PAGE ANSWER

1	$(0.1)^2$, 10% , $\frac{1}{2}$, $\sqrt{1}$, π	13a	0.7 km
2a	26499	13b	8.75 cm ²
2b	25500	14ai	$\frac{11}{36}$
3	The vertical axis stating the number of devices sold does not start from 0. This might cause readers to think that the number of devices sold for Samsung is 3 times compared to Kphone. However, the difference is only 4 devices.	14aii	$T_n = \frac{2n-1}{n^2}$
		14b	$n = 74\frac{5}{7}$ 520 is not a term as the pattern number <i>n</i> is not a positive integer.
4	$x = -\frac{1}{2}$ or $x = -6$	15	5.36% (only by using depth of water, not volume of water)
5	By converse of pythagoras' theorem, triangle <i>RST</i> is a right-angled triangle	16a	$H = 30.72$ cm
6a	$x < 7\frac{1}{3}$	16b	7 : 64
6b	$x = 7$	17a	108°
7a	$a = \frac{Mq-b}{2}$	17b	144°
7b	$M = -13$	17c	10
8	\$267	18a	Coordinates of <i>R</i> = (0, 3)
9	$x = 3$ and $y = 2$	18b	6 units ²
10a	$\frac{2}{5}$	18c	$\angle PQO = 67.4^\circ$
10b	Number of girls =6		
11a	a = 3 b = 2 c = 1		
11b	not all the powers of prime factors are even numbers.		
12ai	41	12c	hard to quantify a partial symbol
12aii	30.5		degree of accuracy of drawn figures is low
12b	65%		too many classes of data leading to confusing/hard to visualise/massive pictogram