Name and Register Number: ( )	Class:

SENG KANG SECONDARY SCHOOL
PRELIMINARY EXAMINATION 2020

MATHEMATICS **4045/01**

4 NORMAL ACADEMIC **12 AUGUST 2020**

2 hours

READ THESE INSTRUCTIONS FIRST

Candidates answer on the Question Paper.
Write your class, index number and name 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 staples, paper clips, 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.

At the end of the examination, fasten all your work securely together.
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 80.

80

Parent's / Guardian's Signature: .....

This document consists of **16** printed pages and **0** blank page.

[Turn Over

Mathematical Formulae

Compound interest

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

Geometry and Measurement

Curved surface area of a cone $= \pi rl$

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

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

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

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

Arc length $= r\theta$, where θ 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 **(a)** Express $\frac{9}{24}$ as a decimal.

Answer ..... [1]

(b) Write 1720.9394 in 3 significant figures

Answer ..... [1]

(c) In 2018, the men's marathon world record was 2 hours 2 minutes and 50 seconds.
In 2019, a new world record was set and it was 3 mins 17 seconds faster than the previous record.
Write down the timing of the new world record set in 2019.

Answer ..... hours ..... minutes ..... seconds [2]

2 y is proportional to the cube of x.
Given that $y = 3$ when $x = 2$, find y when $x = 5$.

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

3

Chocolate Brownie Recipe
280g of flour
140g of butter
4 eggs
100g of cocoa powder
50g of chocolate chips
260g of brown sugar

The above recipe makes exactly 24 brownies

(a) Find the ratio of the mass of brown sugar to mass of butter in the recipe.

Answer ..... : ..... [1]

(b) Mrs Brown wants to make 100 brownies to sell.
How many kilograms of flour will she need?

Answer ..... *kg* [2]

4 Factorise

(a) $8x^2 - 6xy^3$,

Answer ..... [1]

(b) $2m^2 - 18$.

Answer ..... [2]

5 The distance from Ali's house to his school is 2.2 *km*.

(a) A map has a scale of 1 : 50 000.
Calculate the distance of Ali's house to the school on the map.

Answer ..... *cm* [1]

(b) Ali's school covered an actual area of 8 km^2.
Calculate the area, in square centimetres, covered by the school on the map.

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

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6 **(a)** An expression for the nth term of a sequence is $5 + 3n$.
Find the 7th term of the sequence.

Answer ..... [1]

(b) Johnny said that 38 is a term in the sequence.
Show clearly with working if Johnny is right or wrong.

Answer Johnny is ..... because .....
..... [2]

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7 **(a)** It is given that x and y are integers such that $-4 \leq x \leq 2$ and $3 \leq y \leq 6$.
Find the smallest value of $x + 2y$.

Answer ..... [1]

(b) **(i)** Solve $1 < 2x - 3 \leq 9$.

Answer ..... [2]

(ii) Represent the solution on the number line below.

Answer

[2]

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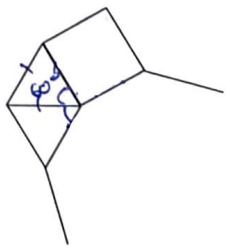
8 The diagram shows an incomplete regular polygon with n sides, 2 equilateral triangle and 1 square.
Find the value of n.



Answer ..... [4]

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9 (a) Rearrange $a = \frac{b}{2x-1}$ to make x the subject.

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

(b) Solve these simultaneous equations.

$2x + y = 3$

$-2y + 3x = 8$

Answer $x =$ .....

$y =$ ..... [3]

10 A bag contains 6 green counters, 9 white counters and 1 yellow counter.

(a) A counter is taken from this bag at random.

(i) Find the probability that this counter is green.

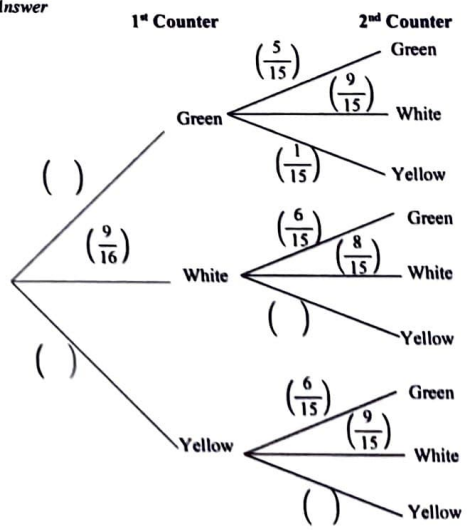
Answer ..... [1]

(ii) Find the probability that this counter is green or white.

Answer ..... [1]

(b) (i) Two counters are taken from the bag, one after another, without replacement.
Complete the tree diagram to show all the possible outcomes.

Answer

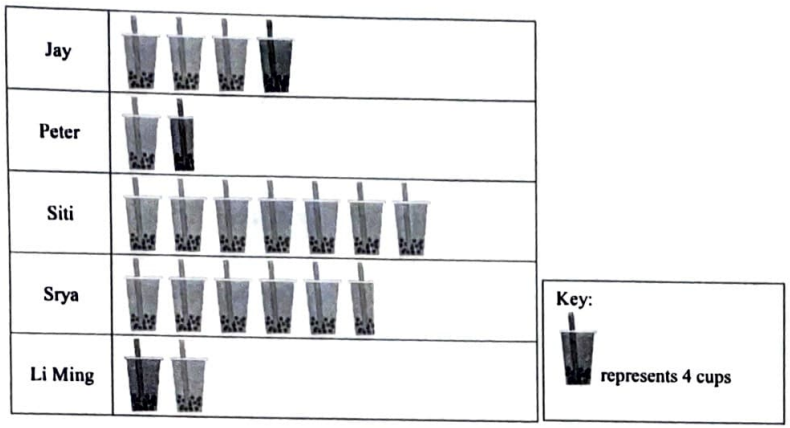


[2]

(ii) Find the probability that the two counters are of the same colour.

Answer ..... [2]

11



A survey is conducted to find out the number of cups of bubble tea each student drink in the month of December. The pictogram above shows the survey results of 5 students.

(a) How many cups of bubble tea did they drink in total?

Answer ..... [1]

(b) Find the difference in the number of cups of bubble tea drank by Srya and Li Ming.

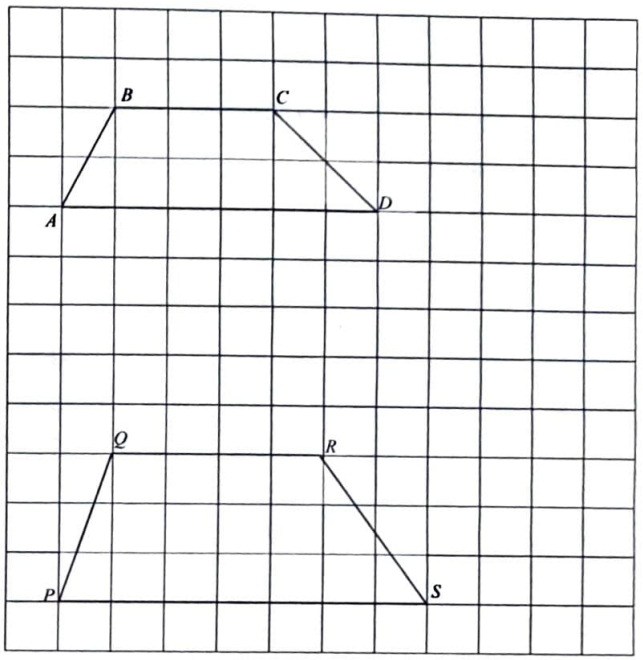
Answer ..... [1]

(c) The survey results is presented using a pic chart instead. The size of the sector representing the number of cups of bubble tea drank by Jay is 72°.
Calculate the size of the sector representing the number of cups of bubble tea drank by Srya.

Answer .....° [2]

12 Figure *ABCD* and *PQRS* are drawn on the grid below.

Answer (a)



(a) Draw an enlargement of *ABCD* using the scale factor of 0.5. Label the figure *WXYZ*. [2]

(b) Is *ABCD* similar to *PQRS*? Justify your answer.

Answer .....

.....

.....

.....

..... [2]

13

2	1	2	6			
3	2	2	2	5		
4	1	4	7	8		
5	1	1	2	4	7	8

Key
2 | 1 means 21 cm

The stem and leaf diagram below represents the height of 17 plants that Sammy measured in his farm recently.

(a) Write down the modal height of the plants.

Answer ..... cm [1]

(b) Find the interquartile range of the heights of the plants.

Answer ..... cm [2]

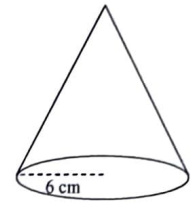
(c) Peter also planted 17 plants where the median height of the plants is 46cm.
Sammy said that his plants are generally taller than Peter's plants.
Do you agree with Sammy's statement? Explain with reason.

Answer I ..... with Sammy's statement because .....

.....

.....[1]

14



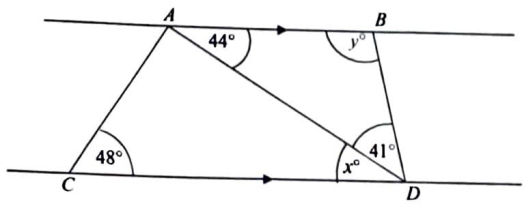
A solid cone has a radius of 6cm and a total surface area of 301.6cm^2.
Find the slant height of the cone.

Answer ..... cm [3]

15 The cash price of a computer is $2199.
A customer can buy the computer on hire purchase with a down-payment of $200 and monthly instalments over 5 years and at an interest rate of 3.2% p.a. How much is the monthly instalment?

Answer $ ..... [4]

16



(a) In the figure, AB and CD are straight lines, AB // CD, angle $ACD = 48°$, angle $BAD = 44°$ and angle $ADB = 41°$. Stating your reasons clearly.

(i) find x,

Answer $x =$ ..... [1]

(ii) find y.

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

(b) Given A, C and D forms a triangle of area 14.3 cm^2 and AC is 5.1cm, find the length of CD.

Answer .....cm [2]

17 In triangle ABC, $AB = 9$cm, $BC = 7$cm and $AC = 5$cm.
AB is drawn below.

Answer (a)(b)(c)(d)

(a) Construct triangle ABC. [1]

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

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

(d) The point P is on the bisector of angle ABC and is the same distance from A and it is from B. Mark and label the position of P. [1]

18 Simplify $4x - 3(2 - x)$.

Answer ..... [1]

19 The frequency table shows the prices of 40 books.

Price ($)	6	8	10	12
Frequency	9	7	10	14

(a) Find the mean prices of the books.

Answer $ ..... [1]

(b) Calculate the standard deviation.

Answer $ ..... [2]

20 (a) Given that $5^p = 5^5 \times \sqrt{5}$, write down the value of p.

Answer $p =$ ..... [1]

(b) Simplify $32a^4 \div 4a^2$. Express your answer in positive index.

Answer ..... [2]

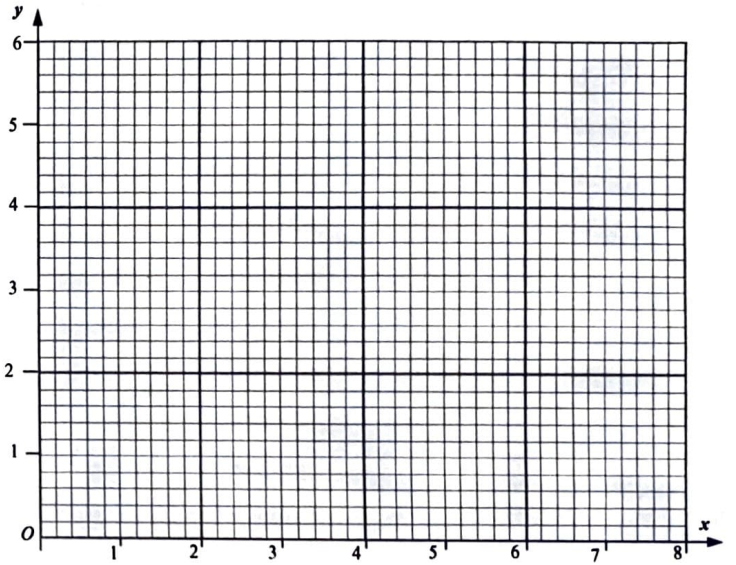
21 (a) Complete the table of values for $2y = 8 - x$.

x	1	2	4	7
y	3.5			

[1]

(b) On the grid below, draw the line $2y = 8 - x$.

Answer (b)(d)



[2]

(c) Write down the coordinates of the point where the line $2y = 8 - x$ crosses the y – axis.

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

(d) Using the axes above, draw the line which has a gradient of 1 and passes through the point (2, 0)

[2]

(e) Hence, write down the coordinates of the point where the 2 lines intersect.

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

END OF PAPER