PEICAI SECONDARY SCHOOL
SECONDARY 4 NORMAL ACADEMIC
PRELIMINARY EXAMINATION 2020

CANDIDATE NAME	

CLASS				REGISTER NUMBER	

MATHEMATICS **4045/01**
Paper 1 **29 July 2020**
2 hours

Candidates answer on Question Paper

READ THESE INSTRUCTIONS FIRST
Write your register number, class 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 number of marks for this paper is 80.

For Examiner's Use

	ANnotations	**AC**curacy	**U**nits
Marks Deducted	**3**	**1**	**1**

This document consists of **19** printed pages and **1** blank pages.

Setter: Ms Novell Tham

[Turn over

Mathematical Formulae

Compound Interest

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

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

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

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

Answer **all** questions

1 Write the following numbers in order of size, smallest first.

$$1.038 \times 10^3 \quad , \quad 1038.67 \quad , \quad \frac{2077}{2} \quad , \quad 1039\% \quad , \quad -1037 .$$

Answer ..…… , …… , …… , …… , …… [1]

Smalllest **Largest**

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2 By rounding each number to 1 significant figure, estimate the value of

$$\frac{10.35 \times 9.2}{2.2345} .$$

Show your working.

Answer …… [2]

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3 Due to the Covid 19 situation, students of class 4E was tasked to conduct a survey to find out the total number of absentees from school in the month of April 2020.
The table below shows the results of the survey.

90	95	91	110	102	107	72
75	70	80	90	100	105	100
80	76	90	80	84	73	74

To better analayze the results, class 4E decided to group their data and make a frequency table. Linda of class 4E suggested to group their data as follows:

$70 \le x \le 80$ $80 \le x \le 90$ $90 \le x \le 100$ $100 \le x \le 110$

where x represent the number of absentees.

Do you agree with Linda's grouping of data? Explain your answer.

Answer I …….. because …….

…….

……[2]

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4 Solve the inequality $3x - 4 \le 17$.

Answer …… [2]

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5 Write $\frac{3x}{2} - \frac{2(x-4)}{5}$ as a single fraction in its simplest form.

Answer …… [2]

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6 Make w the subject of $2x = \sqrt{w^2 - 4yz}$.

Answer $w =$…… [3]

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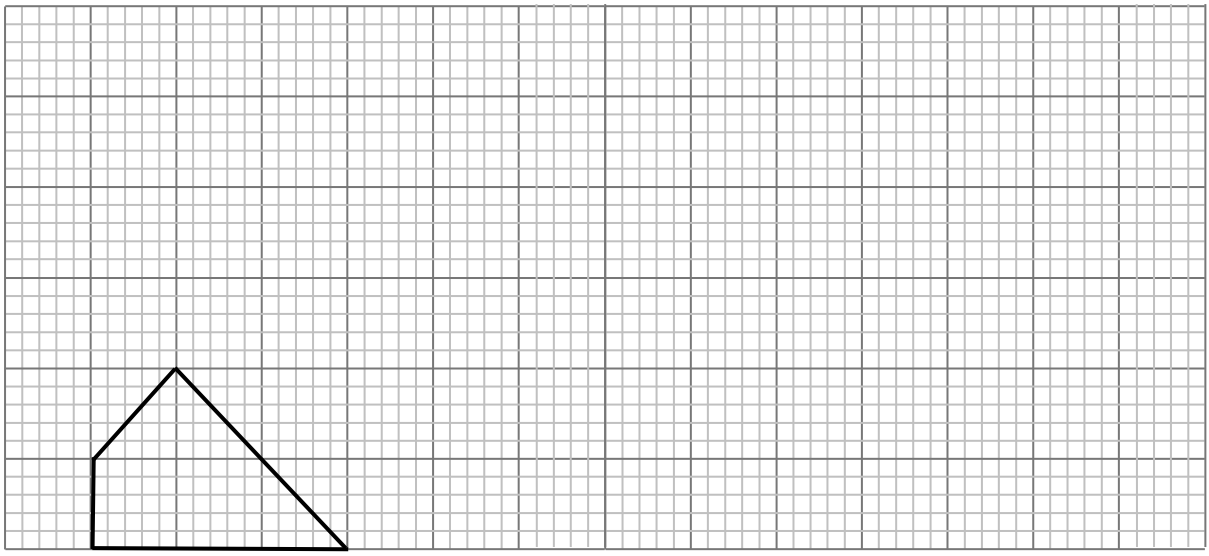
7 Draw an enlargement of this given shaper using the scale factor 3.



[2]

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8 A box contains 25 pens, p of which are red, $(2p + 1)$ are black and the rest are blue. A pen is chosen at random from the box.

(a) Write down the probability that the pen chosen is green.

Answer …… [1]

(b) Write down, in terms of p, the probability that the pen chosen is blue.

Answer …… [2]

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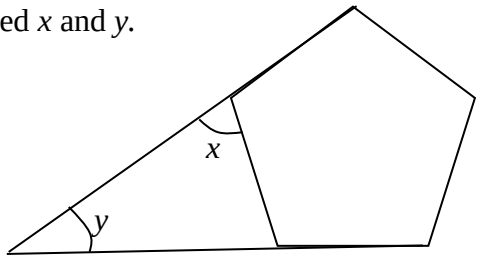
9 Two sides of a regular pentagon are produced to meet as shown in the figure.

Find the angles marked x and y.



Answer $x =$ ..... ° [2]

$y =$ ..... ° [1]

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10 Solve the simultaneous equations.

$$x + 2y = 9$$
$$2x - y = 12$$

Answer $x =$ .....

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

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11 The table shows partial information about the number of people infected with dengue fever from January 2020 to March 2020 in Singapore.

	Men	Women	Children
Fraction of People infected with dengue fever	$\frac{2}{5}$	$\frac{1}{10}$	
Number of People infected with dengue fever	1600		

(a) Find the fraction of children infected with dengue fever from January 2020 to March 2020 in Singapore.

Answer …… [1]

(b) Find the total number of childen infected with dengue fever from January 2020 to March 2020 in Singapore.

Answer ……children [2]

12 A group of 12 students participated in a Mathematics Competition. Their results are shown in the stem-and-leaf diagram below.

6	0 0 5
7	1 4 8 8 8
8	6 7 7
9	7

Key 6 | 5 means 65 marks

(a) Write down the modal marks.

Answer ……..marks [1]

(b) Find the median marks.

Answer ……..marks [1]

(c) Find the mean marks.

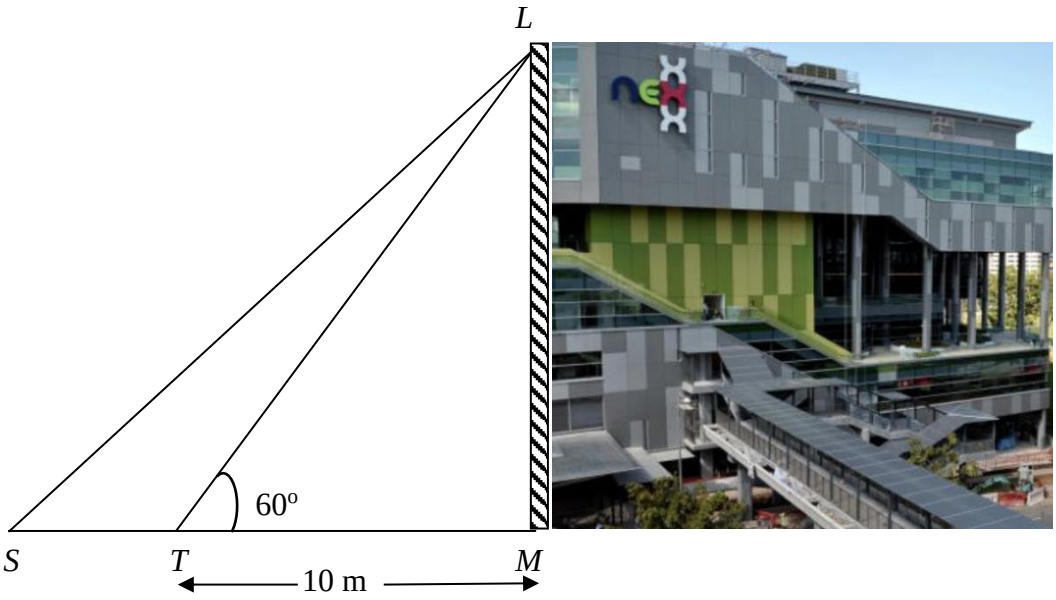
Answer ……..marks [2]

13 Melvin leaves his home at Yishun at 8am and travels to work at an average speed of 45km/h.
Susan leaves her home at Yishun at 8.15am and travels to work at an average speed of 80000m/h.
Both Melvin and Susan needs to travel 20km to work.
Who will arrive at their workplace first?
Show your working.

Answer

[4]

14



The figure above shows the Nex building, *LM*, where *M* is the foot of the building. Sally and Tommy stand at *S* and *T* respectively and look up at point *L*. Given that angle *LTM* is 60^o and Tommy stands 10m away from the building,

(a) Find *LM*, the height of the building,

Answer ……m [2]

(b) If Sally is 12 m away from the building, find the angle *LSM*

Answer ……^{o} [2]

15 A is the point $(-1,3)$ and B is the point $(5,15)$.

(a) Calculate the gradient of the line segment AB.

Answer ..... [2]

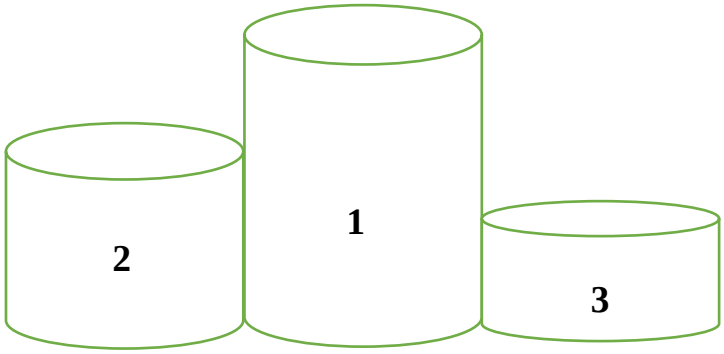
(b) Calculate the length AB.

Answer ..... [2]

(c) Find the equation of the line AB.

Answer ..... [2]

16



The diagram above shows a prize podium made of solid wood, comprising of three stands for '1st place' , '2nd place' and '3rd place'. The height of the '2nd place' stand 25% lower than the '1st place', and the '3rd place' stand is 25% lower than the '2nd place' stand. The base area of each stand is a circle of same area.

Given that the height of the '2nd place' is 75cm and the base is a circle of radius 28cm, calculate the total volume of the wood used to make the solid podium.

Answer ……cm^3 [4]

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17 **(a)** Simplify $\dfrac{a^5 \times a^0}{(ab)^7}$, leaving your answers in positive indices.

Answer ..... [2]

(b) Given that $16^{\frac{1}{3}} \div 8 = 2^a$, find the value of a

Answer $a =$ ..... [2]

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18 **(a)** Expand and simplify $4-(x+3)(x-4)$

Answer ..... [2]

(b) Solve the equation $2x^2 + x - 3 = 0$.

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

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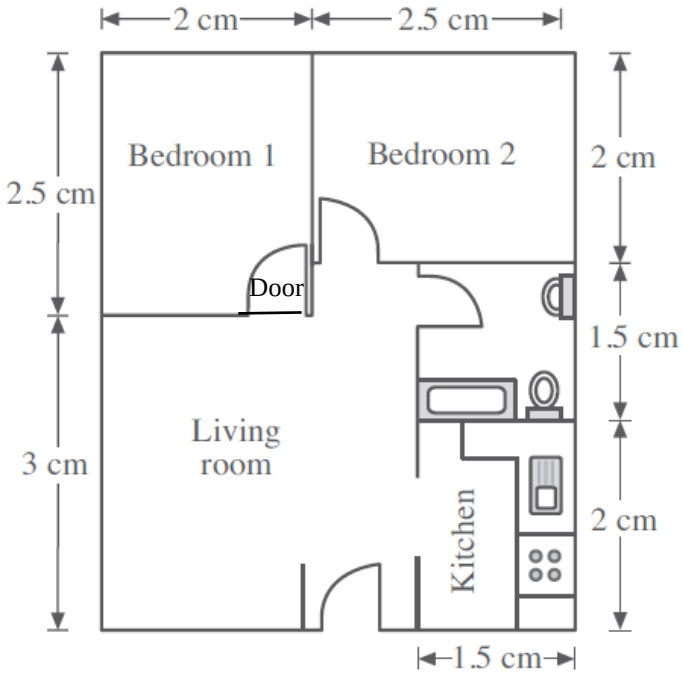
19 The diagram shows a floor plan of an apartment. The scale of the plan is 1 : 300.



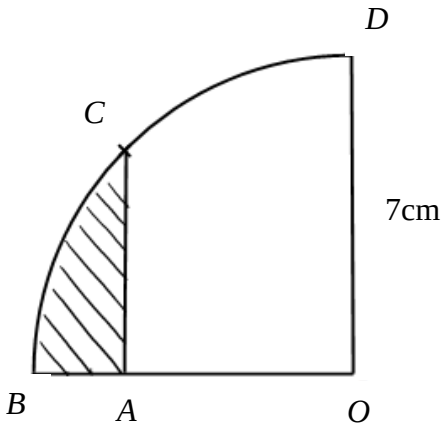
(a) Find the actual dimensions (length by breadth) of the Bedroom 1.

Answer …… cm by …….cm [2]

(b) Find the actual area of the Bedroom 1 in square metres.

Answer ……m^2 [2]

20 In the figure, *OBD* is a quadrant of radius 7 cm, *C* is the midpoint of arc *BD*, and *CA* is perpendicular to *OB*. Find the area of the shaded part. (Take $\pi = \frac{22}{7}$)



Answer ……cm^2 [5]

21 The rate of 6-monthly road tax for cars from 1 July 2019 is shown in the table below.

Engine Capacity (EC) in cc	6-monthly Road Tax Formula
$EC \leq 600$	[\$200 × 0.782]
$600 < EC \leq 1{,}000$	[\$200 + 0.125 × (EC - 600)] × 0.782
$1{,}000 < EC \leq 1{,}600$	[\$250 + 0.375 × (EC - 1,000)] × 0.782
$1{,}600 < EC \leq 3{,}000$	[\$475 + 0.75 × (EC - 1,600)] × 0.782
$EC > 3{,}000$	[\$1,525 + 1 × (EC - 3,000)] × 0.782

(a) Calculate the 6-monthly road tax on a car of Engine Capacity 1,500 cc.

Answer \$…… [2]

(b) If the annual road tax on a certain car is \$1,446.70, calculate the Engine Capacity of the car.

Answer ……..cc [3]

22 It is given that y is inversely proportional to the square root of $5x$.
When $y = 4$ when $x = 5$.

(a) Find an equation connecting x and y.

Answer …… [2]

(b) Find the value of y when $x = 20$.

Answer $y =$…… [1]

(c) Find the value of x when $y = 6.25$.

Answer $x =$…… [2]

23 In triangle *ABC*, *AB* =12cm, *AC* = 10 cm and angle *CAB* = 40°.

(a) Construct an accurate drawing of the triangle *ABC*.
The base *AB* = 12 cm has been drawn for you. [2]

Answer

A 12 cm *B*

(b) Construct the perpendicular bisector of *BC*. [1]

(c) Construct the bisector of angle *ACB* [1]

(d) The point *W* is on the bisector of angle *ACB* and is the same distance from *B* as it is from *C*. Mark and label the position of *W*. [1]

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