



YUSOF ISHAK SECONDARY SCHOOL PRELIMINARY EXAMINATION 2020

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CANDIDATE
NAME

CLASS

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INDEX
NUMBER

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MATHEMATICS SYLLABUS A 4 Normal Academic

4045/01

Paper 1

12 August 2020

Candidates answer on the Question Paper.

2 hours

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number in the spaces provided on the work you hand in.
Write in dark blue or black ink on both sides of the paper.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** the 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.

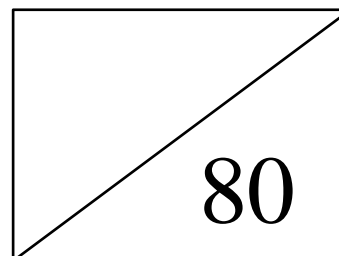
Omission of essential working will result in loss of marks.

The total of the marks for this paper is **80**.

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 of 3.142.



This document consists of **20** printed pages.

Setter: Mr William Hong

[Turn over

Mathematical formulae*Compound interest*

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

Mensuration

$$\text{Curved Surface area of a cone} = \pi r l$$

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

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

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

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

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

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

Trigonometry

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

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

Statistics

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

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

[4]

- 4 (a) The n th term of a sequence is given by $5 - 3n$.
Find the 53rd term of the sequence.

Answer (a) [1]

- (b) The first five terms of another sequence is shown below.

7, 11, 15, 19, 23, ...

Find an expression, in terms of n , for the n th term of the sequence.

Answer (b) [1]

- 5 (a) Write $\frac{3^2}{3^5} \times 3^7$ as a single power of 3.

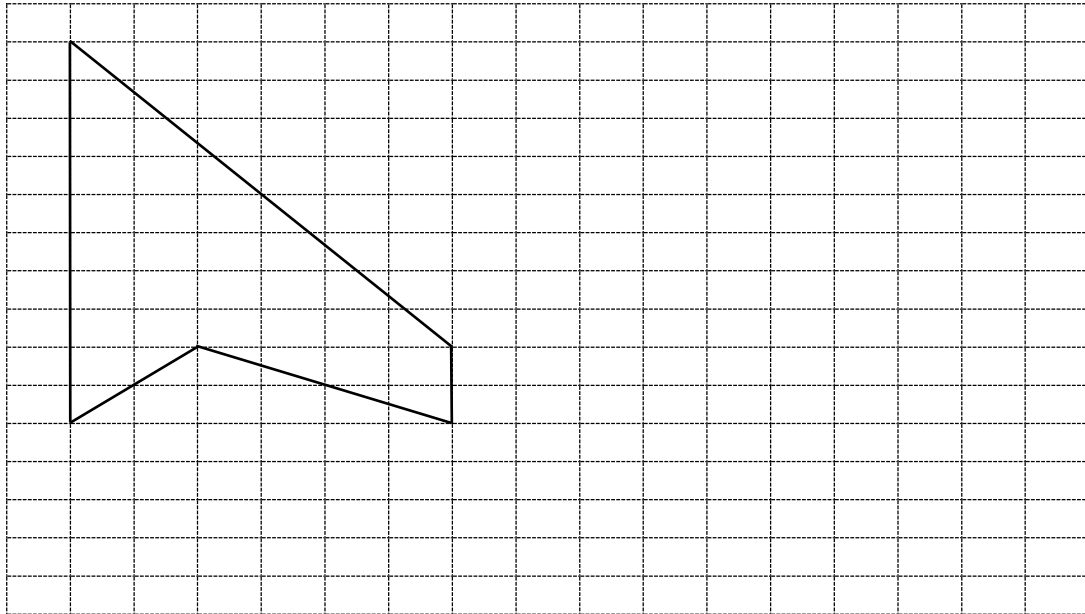
Answer (a) [1]

- (b) Given that $4^x = 16^{-3}$, calculate the value of x .

Answer (b) $x =$ [1]

[5]

- 6 Draw an reduction of the figure below using a scale factor of $\frac{1}{2}$.



[2]

-
- 7 The number of members in a sports club has increased by 8% from 2019 to 2020.
There are 1026 members in 2020.
Calculate the number of members in 2019.

Answer [2]

[6]

- 8 Points $(2, -1)$ and $(-3, -6)$ lie on the line segment CD .
Calculate the length of line segment CD .

Answer units [2]

- 9 Factorise

(a) $2a^2 + 10b + 12$,

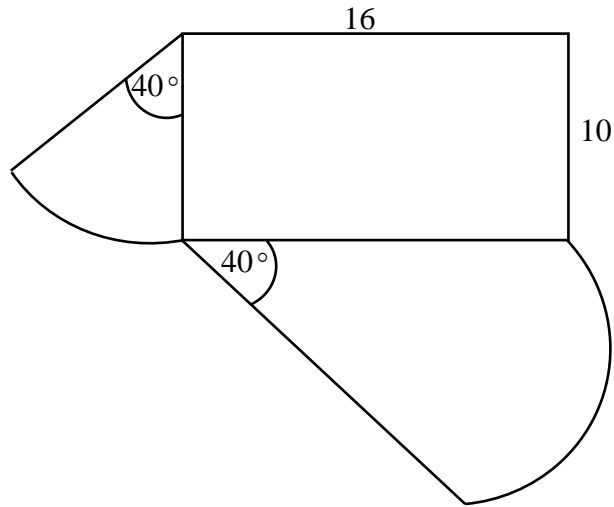
Answer (a) [1]

(b) $2p^2 - p - 3$.

Answer (b) [2]

[7]

- 10 The diagram below shows a figure made up of a rectangle, 16 cm by 10 cm and two sectors, each of angle 40° .



Find the total area of the figure.

Answer cm^2 [3]

11 The scale given on a particular map is 1:125 000.

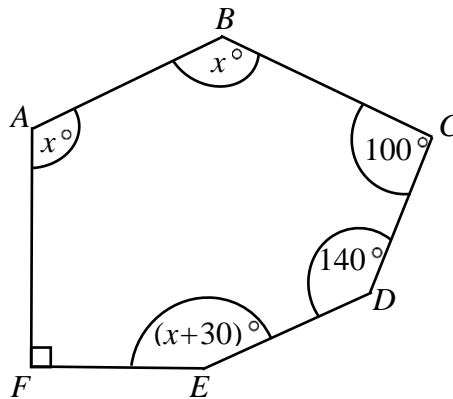
- (a) The length on a path on the map is 3.5 cm.
Find the actual length, in kilometres, of the path.

Answer (a) km [1]

- (b) The area of a water body is 8 km².
Calculate the area, in cm², of the water body on the map.

Answer (b) cm² [2]

12

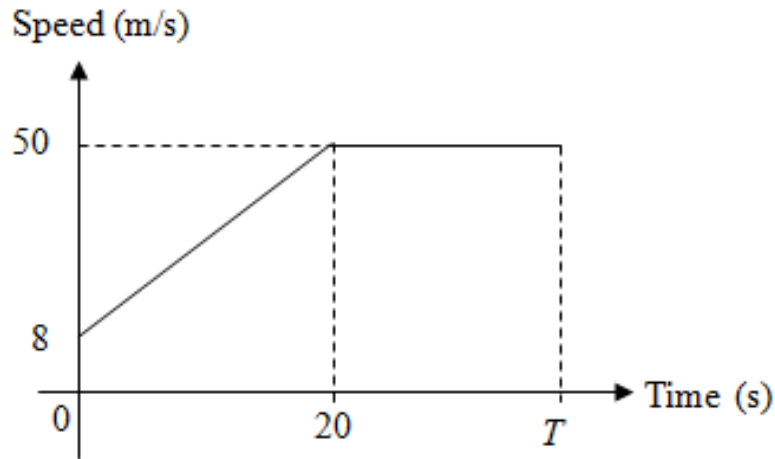


In the hexagon $ABCDEF$, angle $BCD = 100^\circ$, angle $CDE = 140^\circ$ and angle $EFA = 90^\circ$.

Calculate x .

Answer [3]

13



The diagram shows the speed-time graph for the first T seconds of a particle.

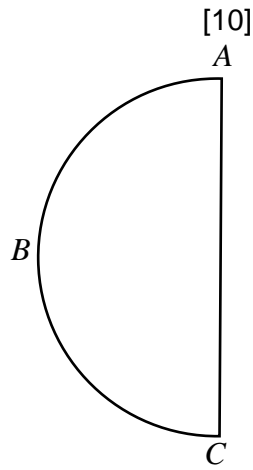
- (a) Calculate the acceleration of the particle for the first 20 seconds.

Answer (a) m/s^2 [1]

- (b) Given that the distance travelled by the particle from 20 seconds to T seconds is 2500 metres, find the value of T .

Answer (b) $T =$ [2]

14 (a)



Semicircle ABC has an area of $162\pi \text{ cm}^2$.
Find the value of the diameter of semicircle ABC .

Answer (a) cm [2]

(b) Convert 1800 cm^2 to m^2 .

Answer (b) m^2 [1]

15 A block of metal has an initial temperature of 800°C .
Liquid was poured over the metal to cool it down.
After 15 minutes, the metal is at a temperature of -55°C .

- (a) Given that the temperature decreases uniformly with time, calculate the rate of decrease of temperature for the metal block.

Answer (a) $^{\circ}\text{C}/\text{min}$ [1]

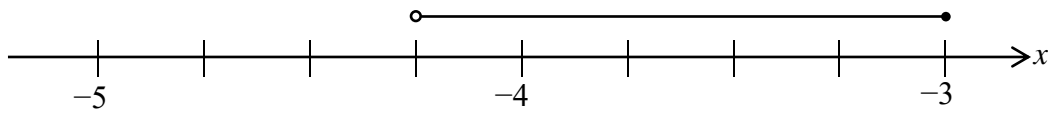
- (b) Calculate the exact temperature of the metal block after 320 seconds.

Answer (b) $^{\circ}\text{C}$ [2]

16 Nigel wants to purchase a television set which has a cost price of \$5000.
He took up a payment offer in which he has to pay 8% of the cost of the television and a monthly fee of \$220 for 2 years.
Calculate the increase in price, using the payment offer, as a percentage of the cost price.

Answer % [3]

17 (a) Write down the inequality represented in the number line below.



Answer (a) [1]

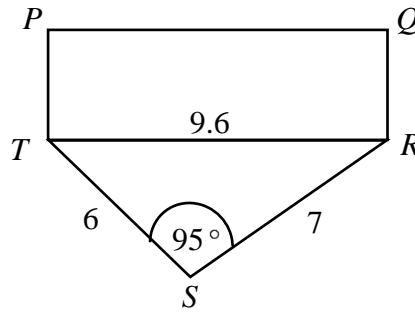
(b) (i) Solve $y < 6y - 65$.

Answer (b)(i) [2]

(ii) Find the smallest prime number satisfying $y < 6y - 65$.

Answer (b)(ii) [1]

18

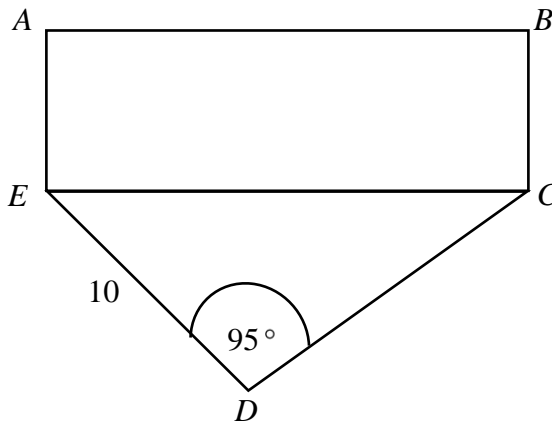


$PQRST$ is a figure made up of a rectangle and a triangle.
 $TR = 9$ cm, $TS = 6$ cm, $SR = 7$ cm, angle $TSR = 95^\circ$.

- (a) Calculate the area of triangle TSR .

Answer (a) cm^2 [2]

- (b)



$ABCDE$ is similar to $PQRST$.
 Calculate AB .

Answer (b) cm [2]

- 19 (a) Amanda wants to find out how much time students spend exercising. She uses this question on a questionnaire.

How many hours do you spend exercising? Tick one box.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1 – 2	3 – 4	5 – 7	More than 7

List one wrong thing about the question.

Answer
..... [1]

- (b) Amanda did another survey on the favourite type of sports in her school. Her results are summarised in an **accurate** pie chart below.



Amanda surveyed a total of 600 students.
Calculate the total number of students whose favourite sport is basketball.

Answer (b) [2]

20 Each letter of the word MESSENGERS is written on separate cards and shuffled. One card is picked at random. Find the probability that

(a) (i) the letter “S” is picked,

Answer (a)(i) [1]

(ii) the letters “N” and “G” are **not** picked. Leave your answer as a fraction in its simplest form.

Answer (a)(ii) [1]

(b) Another set of cards, with each letter of the word SWISS, is written on separate cards and mixed with the set above. Will there be a smaller or greater chance in drawing a letter “S” as compared to the previous set? Explain with suitable workings.

There will be a chance because

.....

.....

..... [2]

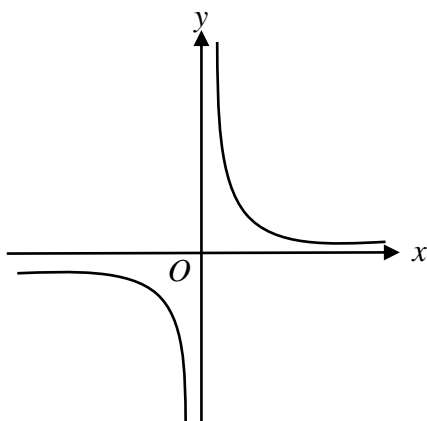
21

- A $y = 2x^{-1}$
- B $y = 2x^{-2}$
- C $y = 2x^3 + 3$
- D $y = 2x^2 + 3$
- E $y = -2x^2 + 3$

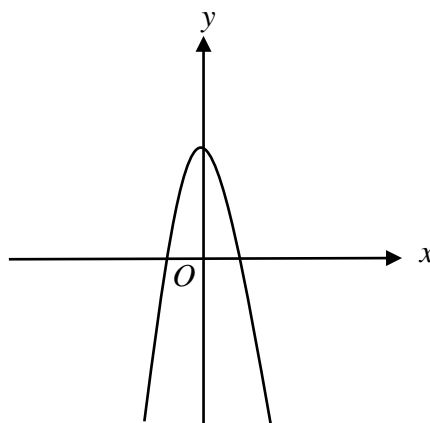
Sketches of the graph of some of these equations are drawn below.

Write the correct equation below each sketch.

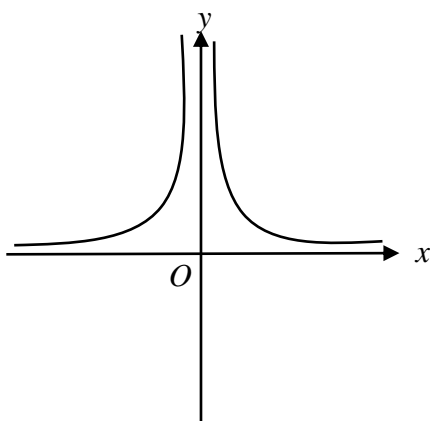
Answer



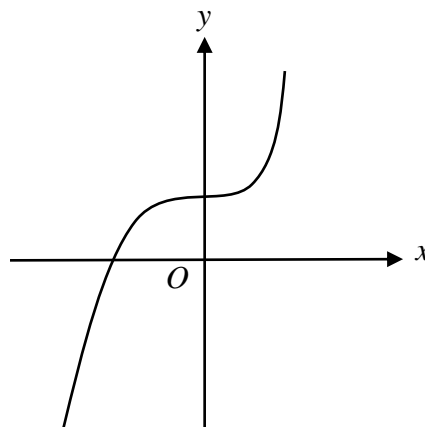
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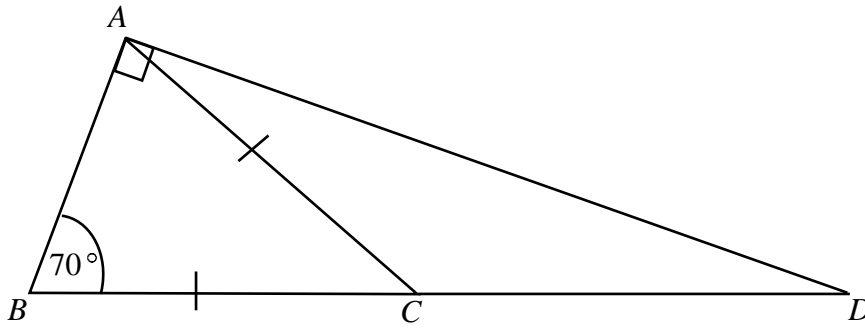
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.....

[4]

- 22 In the diagram, angle $BAD = 90^\circ$ and angle $ABC = 70^\circ$.
 BCD is a straight line and $AC = BC$.



- (a) Find angle ACD .

Answer (a) $^\circ$ [2]

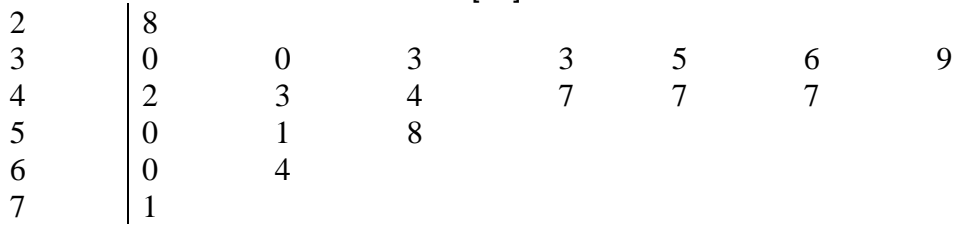
- (b) Hence or otherwise, show that triangle ACD is an isosceles triangle.

Answer

[2]

23

[18]



Key
3 | 0 represents 30 years old

The stem-and-leaf diagram represents the ages of 20 staff in a certain department of a company.

(a) Find the modal age.

Answer (a) [1]

(b) Find the median age.

Answer (b) [2]

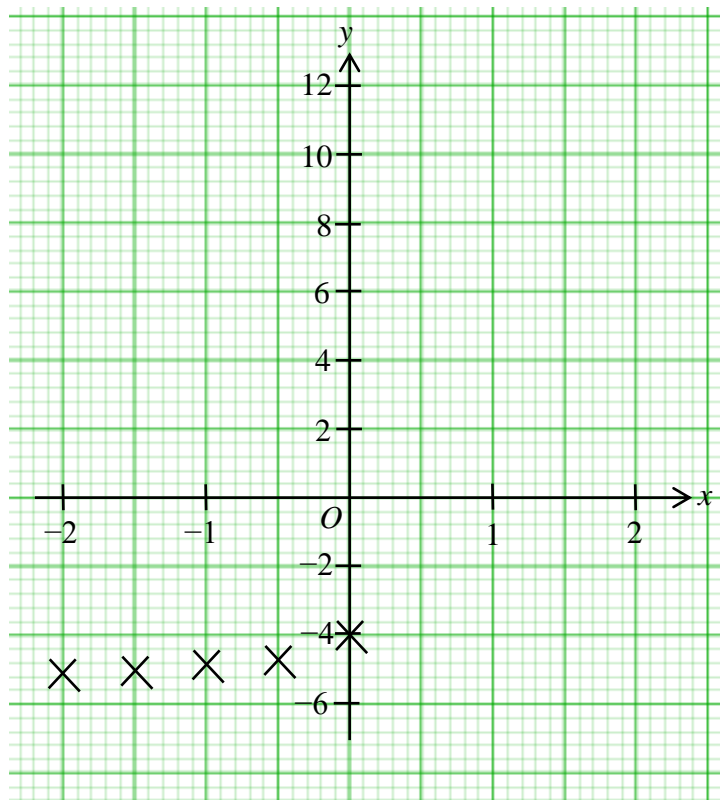
(c) “More than two thirds of the staff are 35 years old or older.”

Is this statement correct? Give a reason for your answer.

.....
 [1]

[19]

- 24 (a) Complete the graph of $y = 4^x - 5$ from $x = -2$ to $x = 2$.
Some points have been plotted for you.



[4]

- (b) Using the same axes, draw a line with a gradient of 0 and passes through (2, 4). [1]

- (c) Write down the x -coordinate of the intersection between the curve and line.

Answer (c) $x = \dots\dots\dots$ [1]

[20]

25 (a) Solve $\frac{x}{3} + \frac{2x+5}{4} = 5$.

Answer (a) $x = \dots\dots\dots$ [2]

(b) Rearrange $x(p+a) = 9$ to make p the subject.

Answer (b) $p = \dots\dots\dots$ [2]

(c) Solve these simultaneous equations.

$$\begin{aligned} 5a + b &= 13 \\ -4a + 3b &= -18 \end{aligned}$$

Answer (c) $a = \dots\dots\dots$

$b = \dots\dots\dots$ [3]

~~End of paper~~