

Name: _____ () Class: _____



華僑中學

HWA CHONG INSTITUTION
PAPER D

INTEGRATED MATHEMATICS

Level : Secondary One

Duration : 2 hours

Do not open this booklet until you are told to do so.

INSTRUCTIONS TO CANDIDATES

Write your name, class and index number on all the work you hand in.

Answer **all** questions.

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 .

INFORMATION FOR CANDIDATES

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.

You are expected to use an electronic calculator to evaluate explicit numerical expressions. **The use of a graphing calculator is not permitted.**

You are reminded of the need for clear presentation in your answers. Omission of essential working will result in loss of marks.

This question paper consists 7 printed pages, including this page.

- 1 Find the smallest integer that is divisible by 136, 272 and 160. [2]
- 2 **Without the use of a calculator and showing your working clearly,**
- (a) evaluate $(-4) \times \left| -2^2 \times 4 - 3 \div [16 - (-2)^2] \right|$, [4]
- (b) estimate the value of $\frac{(2.0101)^2 \times \sqrt{99.78}}{\sqrt[3]{0.001992 \times (10.478)^3 + 62.123}}$, leaving your answer correct to 1 significant figure. [2]
- 3 (a) Simplify $18 - [10 - x - (5 - 2x)]$. [2]
- (b) Simplify $\frac{6x-5}{5} - \frac{5(x-2)}{6}$ into one single fraction. [3]
- 4 Solve $\frac{5+3x}{2} + x = \frac{3}{4} - \frac{2x-3}{8}$. [4]
- 5 Given that $\frac{4p-3q}{3-4q} = \frac{5p}{3}$, express p in terms of q . [2]
- 6 The marked price of a car is \$156 000. It is sold at a 15% discount on its marked price.
- (i) Find the selling price of the car. [2]
- (ii) If the marked price of the car is 20% higher than its cost, determine whether there will be a gain or a loss after selling the car. Justify your answer. [2]
- 7 The sum of two positive integers is 25 and their difference is more than 13.
- (i) Let the larger integer be x , write down an inequality in x to represent the difference. [1]
- (ii) Solve the inequality. [2]
- (iii) List the possible values of the larger integer. [1]

- 8 A sum of money is invested at 8% per annum, with interest compounded half-yearly. If the total amount is \$30 000 at the end of 2 years, what is the sum of money invested originally? Give your answer correct to the nearest dollar. [2]

- 9 Edmund is 3 times as old as Danny. Five years later, Edmund will be twice as old as Danny. Assuming Danny is x years old now, form a suitable equation in x and hence find the present age of Edmund and Danny. [4]

- 10 By observing the number patterns in the table,

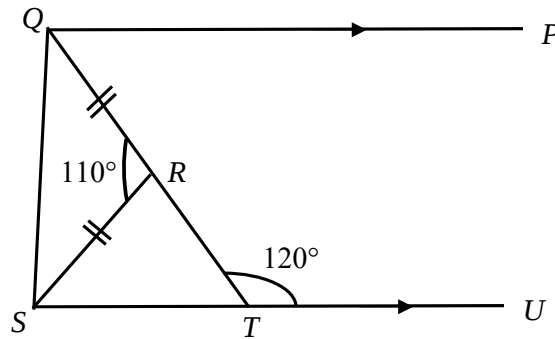
1	2	5	10	...	
4	3	6	11	...	
9	8	7	12	...	
16	15	14	13	...	
...	...	...	...	...	

- (a) Write down the 1st number in the 5th row. [1]
 (b) Write down the 1st number in the 5th column. [1]
 (c) Find, in terms of n , an expression for the 1st number in the n th column. [1]

- 11 (Not examinable in 2020)

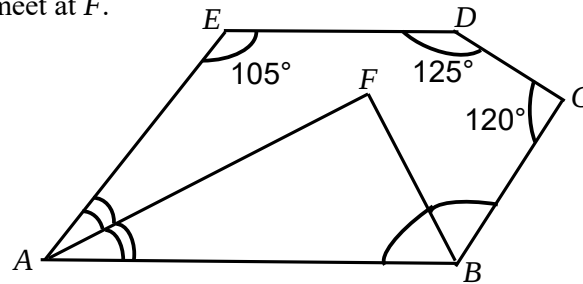
- (i) Sketch the graph of $y = -\frac{2}{3}x + 4$, indicating clearly the x and y -intercepts. [2]
 (ii) Given that the point $P(k, 2)$ lies on the graph of $y = -\frac{2}{3}x + 4$, find the value of k . [2]
 (iii) Find the equation of the line that passes through the point P and the origin. [2]

- 12 In the figure below, STU is a straight line. $\angle QRS = 110^\circ$ and $\angle QTU = 120^\circ$. QP is parallel to SU and R is a point on QT such that $QR = RS$.



Find, stating your reasons clearly,

- (i) $\angle PQT$, [1]
 - (ii) $\angle QSR$ and [1]
 - (iii) $\angle RST$. [2]
- 13 In the figure below, $\angle BCD = 120^\circ$, $\angle CDE = 125^\circ$ and $\angle DEA = 105^\circ$. The bisectors of $\angle A$ and $\angle B$ meet at F .



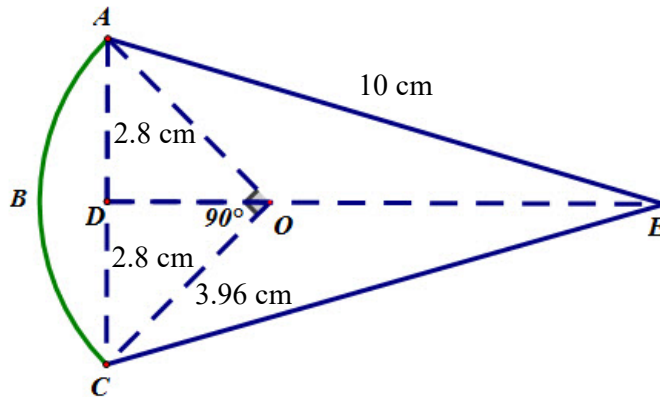
Given that $\angle FAB = x$ and $\angle FBA = y$, find

- (i) the value of $x + y$. [3]
 - (ii) reflex $\angle AFB$. [2]
- 14 Answer the whole of this question on a sheet of plain paper.
- (i) Construct triangle ABC such that $AB = 7$ cm, $BC = 6$ cm and $AC = 6.5$ cm. [2]
 - (ii) Construct the perpendicular bisectors of AB and of BC . Label the intersection point of the two bisectors as M . [2]

Hence,

- (iii) Measure and write down the length of BM . [1]
- (iv) Construct a circle that passes through the three points A , B and C . [1]

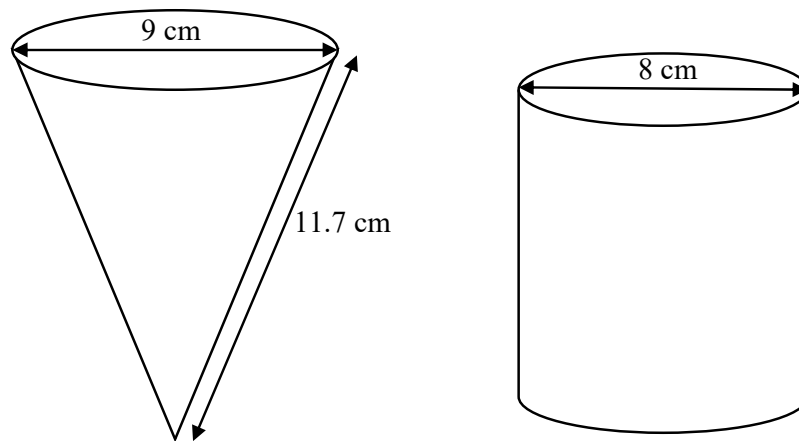
- 15 A piece of cardboard is cut into the shape as shown in the diagram.



ABC is an arc of a circle with centre O and radius 3.96 cm. $\angle AOC = 90^\circ$.

$AD = CD = 2.8$ cm, $AE = CE = 10$ cm. Points D, O, E lies on the same line.

- (i) Find the length of DE . [2]
 - (ii) Calculate the area of the cardboard. Leave your answer in 3 significant figures. [3]
- 16 An inverted cone of diameter 9 cm and slant height 11.7 cm is filled completely with water to the brim. All the water is poured into another cylinder of diameter 8 cm. The diagram is not drawn to scale.



- (i) Find the height of the cone. [2]
- (ii) Find the height of the water in the cylinder. [3]

17 (Not examinable in 2020)

Given that $A = \{x : 0 \leq x \leq 7, x \in \mathbb{Z}\}$, $B = \{x : x < 2, x \in \mathbb{Z}\}$, $C = \{x : 5 < x < 11, x \in \mathbb{Z}\}$, find

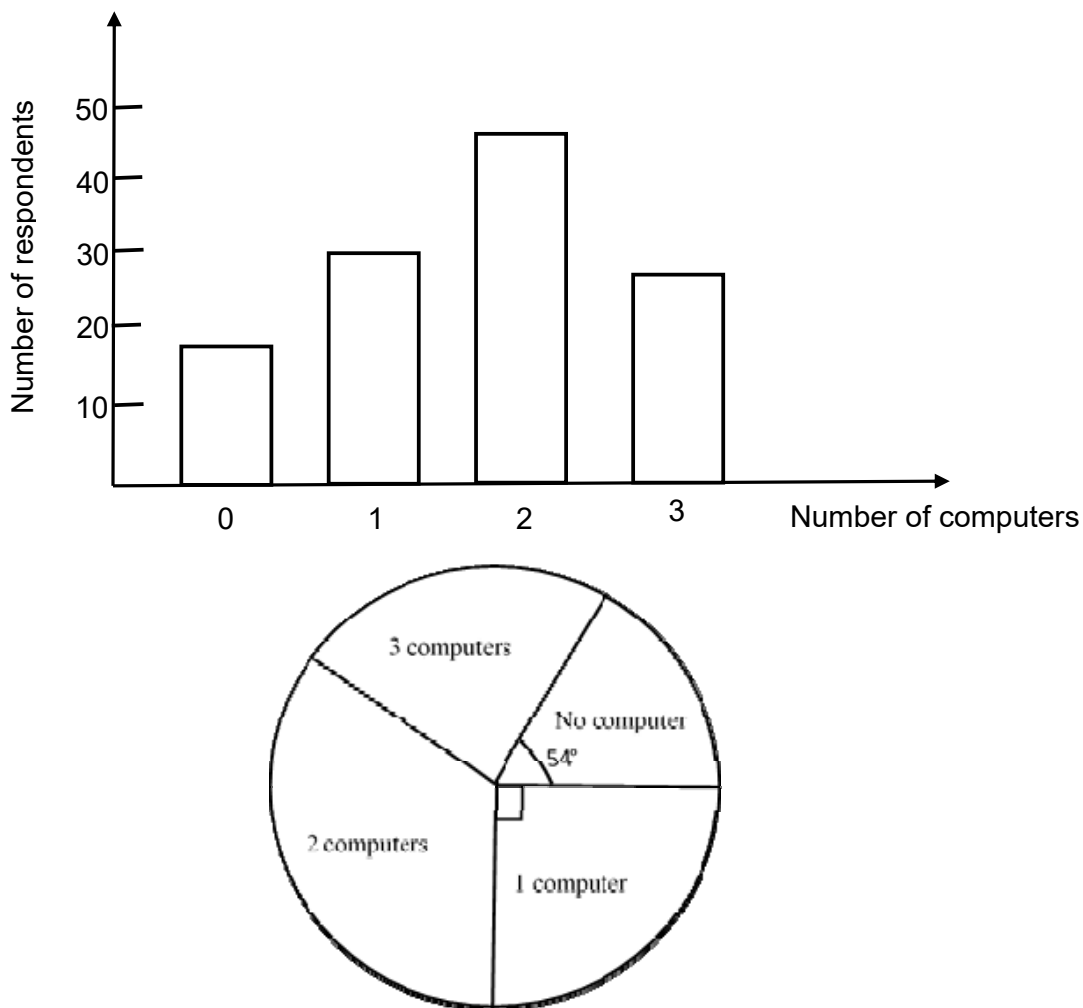
- (a) $n(A \cap B)$ [1]
- (b) $n(A \cup C)$ [1]
- (c) $n(A \cap B \cap C)$ [1]

18 (Not examinable in 2020)

- (a) The universal set $\mathcal{E}$ is the set of all triangles. Given that $A = \{\text{isosceles triangles}\}$,
 $B = \{\text{equilateral triangles}\}$, $C = \{\text{right-angled triangles}\}$, illustrate the sets $\mathcal{E}$, A , B
and C with a clearly labelled Venn diagram. [2]
- (b) The mean of six numbers, -9 , 32 , $q-5$, $2q+1$, $6-2q$ and $3q-7$ is 5.
 - (i) Find the value of q . [2]
 - (ii) Find the median of the six numbers [2]

19 (Not examinable in 2020)

A survey is carried out in Town A to find out the number of computers owned by its residents. The bar chart and the pie chart below shows the distribution of computers owned by a group of respondents in Town A. The number of respondents having no computer is 18.



- (i) Find the total number of respondents interviewed. [2]
- (ii) The same survey is carried out in Town B. The number of respondents in Town A and Town B are the same. The distributions of the numbers of computers at home in Town A and Town B are also the same. The two towns are now combined to form one group. For **each of the bar chart and the pie chart** above, is there any modification needed such that the statistical diagrams show the distribution of the numbers of computers in the combined group? Write down an answer for **each chart** separately. If your answer is “yes”, state the modification needed. [2]

End of Paper

Short Answers:

- 1 2720
- 2(a) -65
- 2(b) 10
- 3(a) $13 - x$ or $-x + 13$
- 3(b) $\frac{11x + 20}{30}$
- 4 $x = -\frac{1}{2}$
- 5 $p = \frac{9q}{20q - 3}$
- 6(i) \$132600
- 6(ii) \$130000
- There will be a gain after selling the car.
- 7(i) $x - (25 - x) > 13$
- 7(ii) $x > 19$
- 7(iii) 20, 21, 22, 23, 24
- 8 \$25644 (nearest dollar)
- 9 Danny is 5 years old and Edmund is 15 years old.
- 10(a) 25
- 10(b) 17
- 10(c) $(n - 1)^2 + 1$
- 12 (i) 60°
- 12 (ii) 35°
- 12(iii) 50°
- 13 (i) 95°
- 13 (ii) 275°
- 14 (iii) $BM = 4.2$ cm
- 15(i) 9.6 cm
- 15(ii) 31.4 cm^2 (3 s.f.)
- 16(i) 10.8 cm
- 16(ii) $4\frac{89}{160}$ cm or 4.56 cm (3 s.f.)