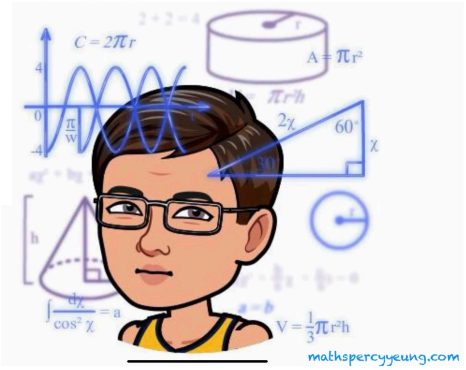
MSC F2 2022-23 Final P1



Class : _____ Name : _____

Time allowed : 1 hour 15 minutes

Full mark : 80

This question-answer book consists of 15 printed pages.

Instructions to candidates:

1. This paper must be answered in English with a blue / black ball pen, unless otherwise specified.

2. Write your name, class and class number in the spaces provided on this cover.

3. This paper consists of TWO sections, A and B.
   Section A carries 40 marks and Section B carries 40 marks.

4. Answer ALL questions in this paper. Write your answers in the spaces provided in this Question-Answer Book. Do not write in the margins. Answers written in the margins will not be marked.

5. All diagrams / graphs / charts as part of the answers must be clearly drawn with an HB pencil.

6. Graph paper and supplementary answer sheets will be supplied on request. Write your name, class and class number on each sheet, and fasten them INSIDE this book.

7. Unless otherwise specified, all working must be clearly shown.

8. The diagrams in this paper are not necessarily drawn to scale.

9. Unless otherwise specified, numerical answers must be exact or correct to 3 significant figures.

10. Calculator pad printed with the “HKEA Approved” / “HKEAA Approved” label is allowed.
    Remove the calculator cover / jacket.

Section A (40 marks)

1. (a) Factorize $x^2 + 8xy + 16y^2$.

(b) Hence, factorize $(m-n)^2 + 8(m-n)(2m+n) + 16(2m+n)^2$.

(5 marks)

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2. If $x^2 + 3(a - cx) \equiv x(x - 4b) + 3b$, where a, b and c are constants, find $a : b : c$. (5 marks)

3. Consider the formula $2(a + b) = 6 - b$.

(a) Make b the subject of the formula.

(b) If the value of a is increased by 1, find the change in the value of b.

(4 marks)

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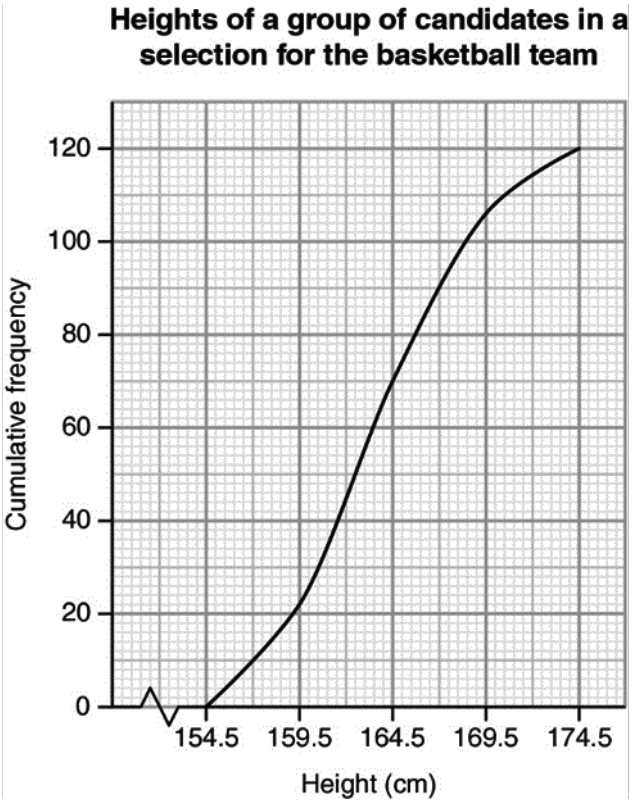
4. The cumulative frequency curve below shows the heights (in cm) of a group of candidates in a selection for the basketball team.



The selection committee proposes that candidates with heights x cm or above can join the basketball team.

(a) If $x = 167$, how many candidates can join the basketball team?

(b) The committee thinks that the value of x proposed in (a) is not high enough. They want only 10% of the candidates to join the basketball team. What is the new value of x?

(c) Later, the committee asks the selected candidates with heights 172 cm or above to undergo an intensive training. What percentage of the candidates chosen in (b) should undergo the intensive training?

(7 marks)

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(Answer for question 4)

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5. The weight of 50 identical postcards is measured as 152.6 g, correct to the nearest 0.2 g.

(a) Find the maximum absolute error of the measurement.

(b) Find upper limit of the actual weight of 50 postcards.

(c) Is it possible that the actual weight of a postcard is 3.06 g? Explain your answer.

(5 marks)

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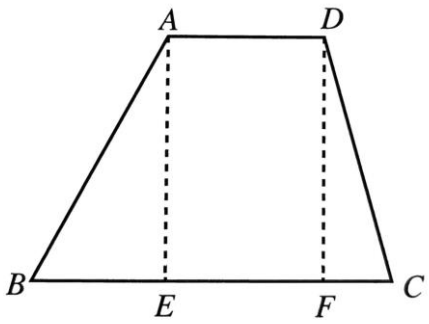
6. In the figure, *BEFC* is a straight line. *AD* // *BC* and *AEFD* is a rectangle. It is given that $\angle ABE = 62°$, $\angle DCF = 75°$, *AD* = 8 cm and *CD* = 13 cm.



(a) Find *CF*.

(b) Find *BC*.

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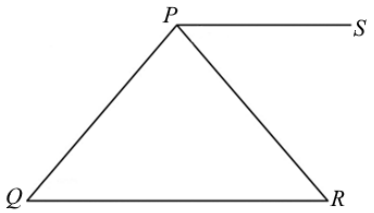
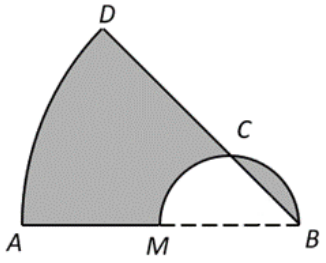
7. In the figure, it is given that $PS // QR$, $\angle QPR = 84°$ and $\angle SPR = 48°$. Prove that $\triangle PQR$ is an isosceles triangle.

(3 marks)



8. In the figure, ABD is a sector with centre B and BCM is a semi-circle. It is given that $AM = BM = 4$ cm and $\angle ABD = 45°$. Find the perimeter of the shaded region in terms of π.

(5 marks)



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Section B (40 marks)

9. (a) Solve the simultaneous equations $\begin{cases} 2x-3y+12=0 \\ 4x+5y-9=0 \end{cases}$. (4 marks)

(b) Hence, solve the simultaneous equations $\begin{cases} \frac{1}{p}-\frac{3}{q}+12=0 \\ \frac{2}{p}+\frac{5}{q}-9=0 \end{cases}$. (3 marks)

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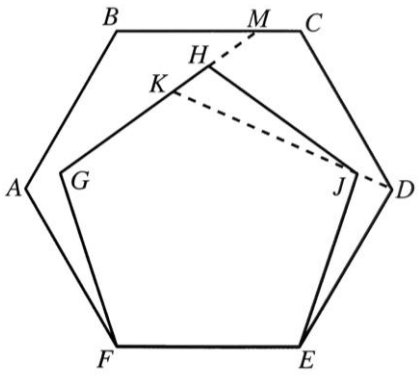
10. In the figure, $ABCDEF$ and $EFGHJ$ are a regular hexagon and a regular pentagon respectively. DJ and GH are produced to meet HG and BC at K and M respectively.

(a) Find $\angle JED$. (4 marks)

(b) Find $\angle CDJ$ and $\angle JKG$. (4 marks)

(c) Find $\angle KMC$. (2 marks)



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(Answer for question 10)

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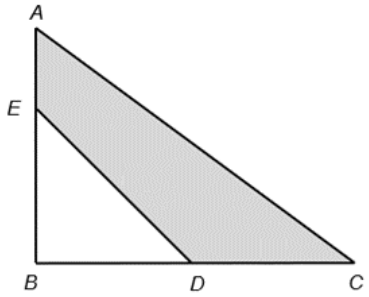
11. In the figure, AEB and BDC are straight lines. It is given that $AC = 10$ cm, $ED = 6$ cm, $BE = \sqrt{20}$ cm, $BD = 4$ cm and $BD = CD$.

(a) Is $AB \perp BC$? Explain your answer. (3 marks)

(b) Find the area of quadrilateral $AEDC$. (4 marks)



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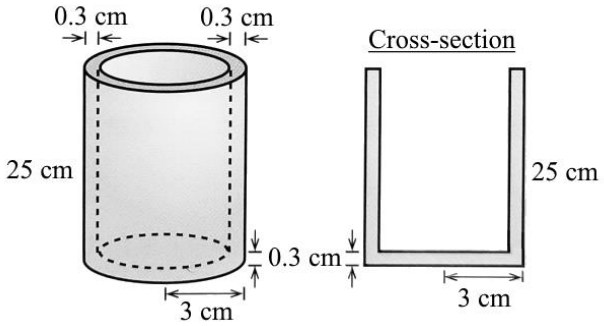
12. In the figure, the thickness of the cylindrical container is 0.3 cm. The outer base radius and the height of the container are 3 cm and 25 cm respectively.



(a) Find the volume of the material required to produce the container. (4 marks)

(b) If the cost of the material in producing the container is \$0.15/cm^3, find the total cost of the material in producing the container. (2 marks)

(c) If the container is fully filled with water, find the total area of the wet surface. (3 marks)

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(Answer for question 12)

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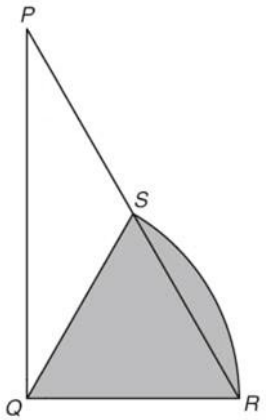
13. In the figure, ΔPQR is a right-angled triangle with $\angle PQR = 90°$, $\angle P = 20°$ and $PQ = 12$ cm. SQR is a sector with centre at Q.

(a) Find $\angle SQR$. (3 marks)

(b) Find the area of sector QRS. (4 marks)



End of Paper

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