HMT F2 2021-2022 First Exam Maths I

Half-Yearly Examination 2021-2022
S2 Mathematics Paper 1
(This Question-Answer Book consists of 10 pages.)

Max. Marks: 100

Time Allowed: $1\frac{1}{2}$ hours

INSTRUCTIONS：

1. This Question-Answer Book consists of two sections, A and B. Section A carries 60 marks, section B carries 40 marks. The maximum mark of this paper is 100.

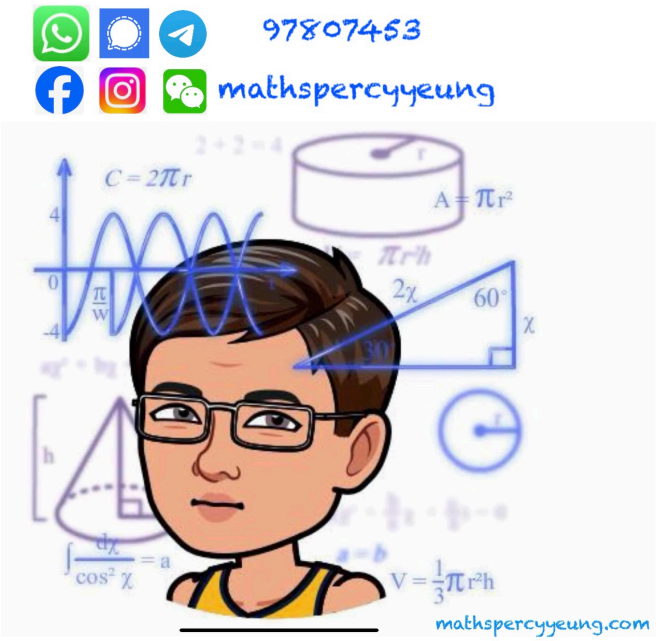
2. Answer all questions in sections A and B. Write your answers in the spaces provided in this Question-Answer book.

3. Unless otherwise specified, numerical answers should either be exact or correct to 3 significant figures.

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

5. Students can use calculators.

6. For all geometric problems, please state the reasons.



Section A (60 marks)

1. Given that $y = -4x^2 + 7$, find the value of y when $x = -2$.

(3 marks)

2. Determine whether $5x - 5(x - 1) = -5$ is an identity.

(4 marks)

3. In Figure 1, $ABCD$ and $EFGH$ are two quadrilaterals such that $ABCD \cong FEHG$. $\angle A = 112^\circ$, $\angle C = 96^\circ$, $\angle F = y$, $AB = 12$ cm, $CD = 10$ cm and $HG = x$ cm. Find x and y.

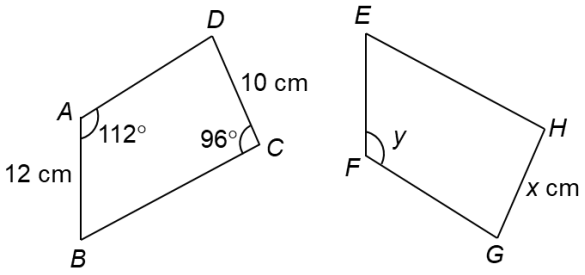


Figure 1

(4 marks)

4. Factorize the following expressions.
   (a) $16pq - 24qr$
   (b) $32a^2 - 80a + 50$
   (c) $9p - 9r + pq - qr$

(5 marks)

5. In each of the following, make the letter in brackets the subject of the formula.

(a) $a = \dfrac{b-5}{2}$ [b]

(b) $pr = q(3-r)$ [r]

(5 marks)

6. In Figure 2, BDC is a straight line and $AB = AD$. $\angle ABD = 58^{\circ}$, $\angle DAC = 25^{\circ}$, $\angle ACD = y$. Find y.

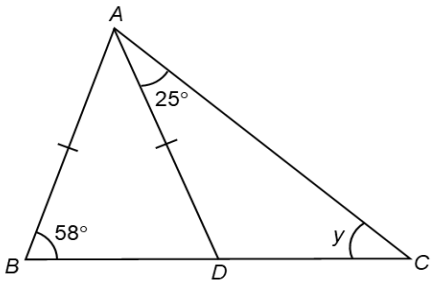
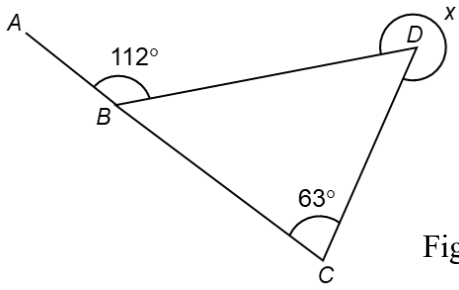


Figure 2

(5 marks)

7. In Figure 3, ABC is a straight line. $\angle ABD = 112^\circ$, reflex $\angle BDC = x$, $\angle BCD = 63^\circ$. Find x.



(6 marks)

Figure 3

8. The area of a flat is 45.6 m^2, correct to the nearest 0.1 m^2.
   (a) Find the maximum absolute error of the measurement.
   (b) Find the lower limit and the upper limit of the actual area.
   (c) Find the range of the actual area of the flat.

(6 marks)

9. The distance of a path is measured as 800 m, correct to the nearest 10 m. Find

(a) the maximum absolute error,

(b) the relative error,

(c) the percentage error

of the measured distance.

(6 marks)

10. Simplify the following expressions.

(a) $\frac{3}{4a} - \frac{2}{3a}$

(b) $\frac{2m-12}{m^2-36}$

(c) $\frac{-xy^2}{y(3x-y)^2} \div \frac{5x}{y-3x}$

(8 marks)

11. In Figure 4, $\triangle CDE \cong \triangle XYZ$. $CD = (2n - 1)$ cm, $DE = (m - 2)$ cm, $XZ = (n + 1)$ cm, $XY = (m + 1)$ cm, $YZ = 10$ cm. Find m and n.

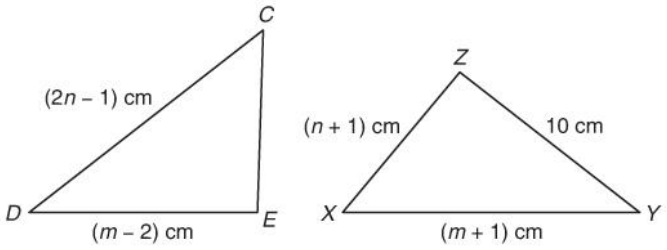


Figure 4 (8 marks)

Section B (40 marks)

12. (a) Expand $(x - C)^2$. (1 mark)

(b) Hence, find the unknown constants A, B and C if $Ax^2 - 2(B + x) \equiv (x - C)^2$. (6 marks)

13. In Figure 5, $\angle CDE = \angle CFE$ and $\angle CED = \angle CEF$.

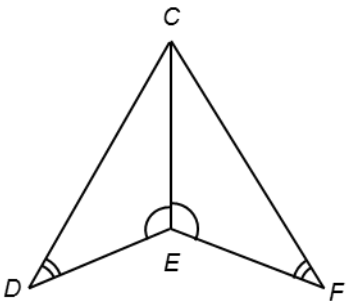


Figure 5

(a) Prove that $\triangle CDE \cong \triangle CFE$. (3 marks)

(b) If the perimeter of $\triangle CDE$ is 17 cm and the length of CE is 5 cm, find the perimeter of quadrilateral $CDEF$. (4 marks)

14. Simplify the following expressions.

(a) $\dfrac{x^2y + xz - xy - z}{x^2y^2 + xyz}$ (4 marks)

(b) $\dfrac{5}{2x+1} - \dfrac{2}{x-4}$ (4 marks)

15. The measured weight of a baby is 5.0 kg with a percentage error of 2%.

(a) Find the maximum absolute error of the measurement. (2 marks)

(b) Find the range of the actual weight of the baby. (4 marks)

(c) Is it possible that the actual weight of the baby is 4.96 kg? Explain your answer. (2 marks)

16. In Figure 6, AE // CD , $CD = DE$, $\angle BAE = 122^\circ$, $\angle ABC = 87^\circ$, $\angle BCE = 116^\circ$.

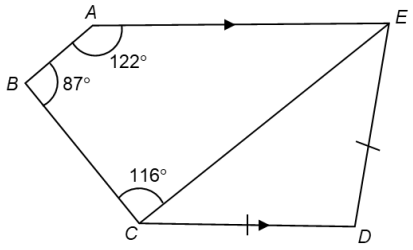


Figure 6

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

(b) Hence, find $\angle CDE$. (7 marks)

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