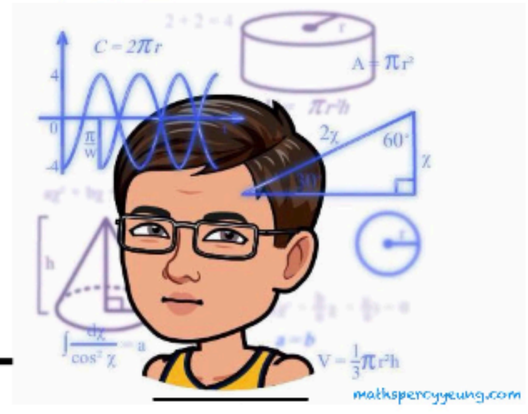


Form 2 Mathematics Question
Booklet for Section A

2A, B, C, D, E

Time allowed: 2 hours

Total: 100 marks

Name: _____ Class: 2 Class Number: _____

Instructions

1. Do not turn over the paper until you are told to do so.

2. Attempt ALL questions in this paper (except Section D, which is optional). All answers should be written on the respective answer sheets.

3. This paper consists of 4 sections, Sections A, B, C and D.

4. Write down your name, class and class number on the first page of all Question-Answer Booklets.

5. Section A is a multiple-choice section. Note that you may only choose **one** answer to each question in this section. If you choose more than one answer, you will receive **no marks** for that question. All questions in this section carry equal marks and no marks will be deducted for wrong answers. You must use a pencil to mark all the answers on the MC Answer Sheet for Section A. Otherwise, no marks will be awarded.

6. In Sections B, C and D, all workings must be clearly shown. Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.

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

Section A: Multiple Choice Questions (30 marks)

1. 0.012765 =

   A. 0.01 (correct to 3 significant figures).

   B. 0.012 (correct to 4 decimal places).

   C. 0.0127 (correct to 3 significant figures).

   D. 0.01277 (correct to 5 decimal places).

2. The marked price of a chair is 25% above its cost. A profit of $48 is made when the chair is sold at a 10% discount on its marked price. Find the marked price of the chair.

   A. $320

   B. $384

   C. $400

   D. $480

3. $\dfrac{m^5}{\left(mn^2\right)^3} =$

   A. $\dfrac{m^2}{n^8}$.

   B. $\dfrac{m^2}{n^6}$.

   C. $\dfrac{m^2}{n^5}$.

   D. $\dfrac{1}{mn^6}$.

4. $\dfrac{2}{1-3x} - \dfrac{1}{1+3x} =$

   A. $\dfrac{3x+1}{1-3x^2}$.

   B. $\dfrac{9x+1}{1-3x^2}$.

   C. $\dfrac{3x+1}{1-9x^2}$.

   D. $\dfrac{9x+1}{1-9x^2}$.

5. If p and q are constants such that $(x-1)^2+px\equiv(x+4)(x-q)+21$, then $p=$

A. -5.

B. -1.

C. 1.

D. 5

6. It is given that the pair of simultaneous equations $\begin{cases} mx+(n-2m)y=-5 \\ (4n-9m)x-ny=3 \end{cases}$ has a unique solution (a,a), where a, m and n are constants. Find $m:n$.

A. $8:3$

B. $3:8$

C. $5:3$

D. $3:5$

7. The distance between City P and City Q is three times the distance between City Q and City R. The time taken for a car to travel from City P to City Q is double the time taken for the same car to travel from City Q to City R. If the car travels from City Q to City R at an average speed of 36 km/h, find the average speed of the car from City P to City Q.

A. 18 km/h

B. 24 km/h

C. 48 km/h

D. 54 km/h

8. If 36 days are needed for 30 workers to complete a project together, how many workers are needed if the project has to be completed in 24 days?

A. 45

B. 42

C. 24

D. 20

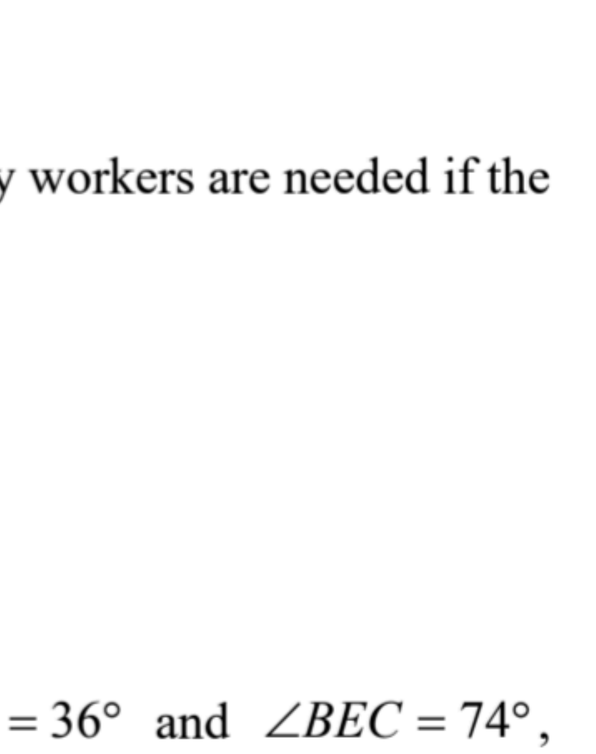
9. In the figure, $DB=DC$ and $AB\ //\ DC$. AC and BD intersect at E. If $\angle BAC=36°$ and $\angle BEC=74°$, then $\angle ABC=$

A. $71°$.

B. $107°$.

C. $108°$.

D. $109°$.



10. In the figure, ABC is an equilateral triangle and $AC = AD$. If $\angle AEB = 80°$, which of the following must be true?

I. $EA = ED$

II. $BA \parallel CD$

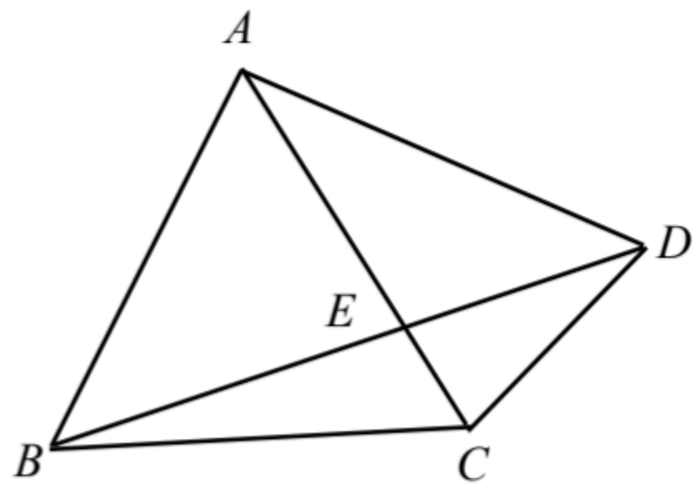
III. $\angle DAC + \angle BDC = \angle ACD$

A. I only

B. II only

C. I and III only

D. II and III only



11. In a regular n-sided polygon, the size of each interior angle is $140°$. Find n.

A. 10

B. 9

C. 8

D. 7

12. Which of the following is an irrational number?

A. $\dfrac{\pi}{2025\pi}$

B. $\sqrt{2025}$

C. $0.2\dot{0}2\dot{5}$

D. $202\sqrt{5}$

13. Which of the following is / are equal to $\sqrt{a^{2025}b^{1000}}$?

I. $a^{1012}b^{500}\sqrt{a}$

II. $a^{1012}b^{500}\sqrt{b}$

III. $\dfrac{a^{1013}b^{500}}{\sqrt{a}}$

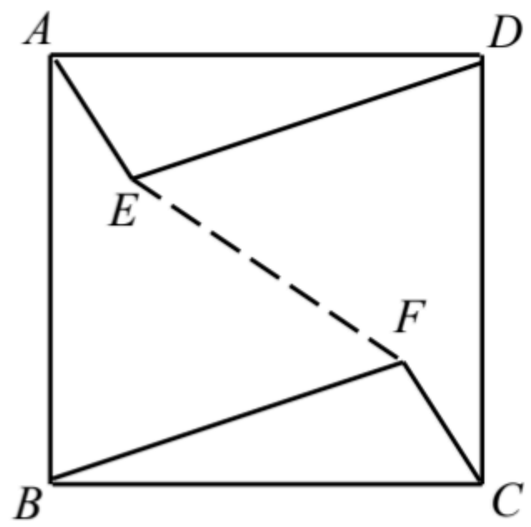
A. I only

B. II only

C. I and III only

D. II and III only

14. In the figure, $ABCD$ is a square. E and F are points inside the square such that $AE \perp ED$ and $\Delta ADE \cong \Delta BCF$. If $AD = \sqrt{20}$ cm and $AE = \sqrt{2}$ cm, then $EF =$



A. 4 cm.

B. $3\sqrt{2}$ cm.

C. $2\sqrt{2}$ cm.

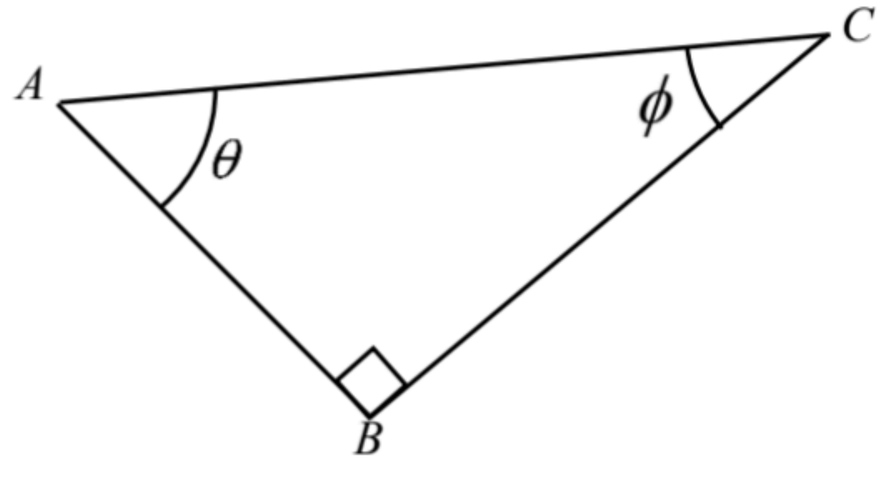
D. 2 cm.

15. Refer to the figure. Which of the following is / are correct?

I. $\sin\theta = \dfrac{BC}{AC}$

II. $\cos\phi = \dfrac{AC}{BC}$

III. $\tan 90° = \dfrac{AB}{BC}$



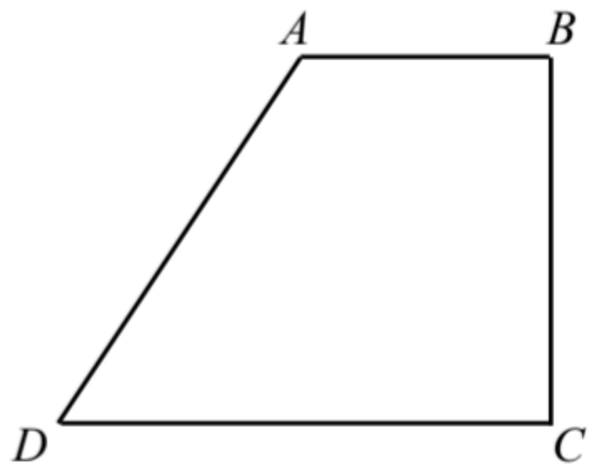
A. I only

B. II only

C. I and III only

D. II and III only

16. In the figure, $ABCD$ is a trapezium with $AB \,//\, DC$ and $BC \perp DC$. If $AB = 24$ cm, $DC = 42$ cm and $\angle ADC = 50°$, find the length of AD, correct to 1 decimal place.



A. 28.0 cm

B. 23.5 cm

C. 15.1 cm

D. 11.6 cm

17. The volume of a cylinder with a base diameter of 6 cm and a height of 15 cm is

A. 90π cm^3.

B. 135π cm^3.

C. 180π cm^3.

D. 540π cm^3.

18. OAB is a sector with O as the centre of the sector. If $OA = 13$ cm and $\overset{\frown}{AB} = 12$ cm, then the area of the sector OAB is

A. $78\ \text{cm}^2$.

B. $156\ \text{cm}^2$.

C. $78\pi\ \text{cm}^2$.

D. $156\pi\ \text{cm}^2$.

19. It is given that $x = 12.5$ (correct to 3 significant figures). The relative error of the estimation is

A. $\frac{1}{250}$.

B. $\frac{1}{125}$.

C. $\frac{1}{50}$.

D. $\frac{1}{25}$.

20. The weight of a pack of sugar is 90 g, correct to the nearest 5 g. Let T g be the total weight of 20 packs of sugar. Find the range of values of T.

A. $1700 \le T < 1900$

B. $1750 \le T < 1850$

C. $1795 \le T < 1805$

D. $1797.5 \le T < 1802.5$

End of Section A

Please proceed to the Question-Answer Books for Sections B, C and D.

Sample Paper

Final Examination

Form 2 Mathematics

Question-Answer Booklet for Section B

Name: _____ Class: 2 Class Number: _____

Section B: Short Questions (30 marks)

1. Factorize

   (a) $4a^2 - 20ab + 25b^2$,

   (b) $4a^2 - 20ab + 25b^2 - 2ac + 5bc$. (3 marks)

2. Solve the pair of simultaneous equations $\begin{cases} 7a + 9b = 1 \\ 4a - 3b = -89 \end{cases}$. (3 marks)

3. Let a, b and c be non-zero numbers such that $3a = 5b$ and $\dfrac{4a+c}{5b+3c} = \dfrac{3}{4}$. Find $a : b : c$. (3 marks)

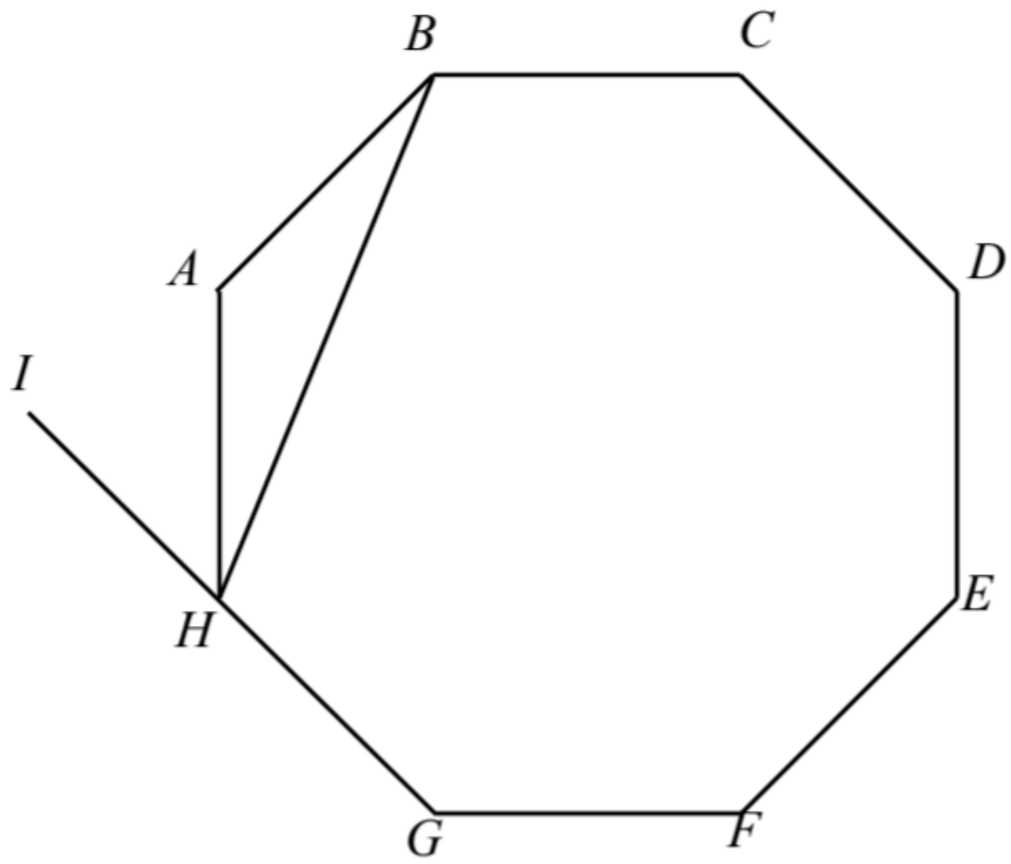
4. (a) Simplify $\sqrt{54} - \sqrt{6}$.

(b) Hence, simplify $\dfrac{\sqrt{3}}{\sqrt{54} - \sqrt{6}}$ and rationalize the denominator of the answer. (4 marks)

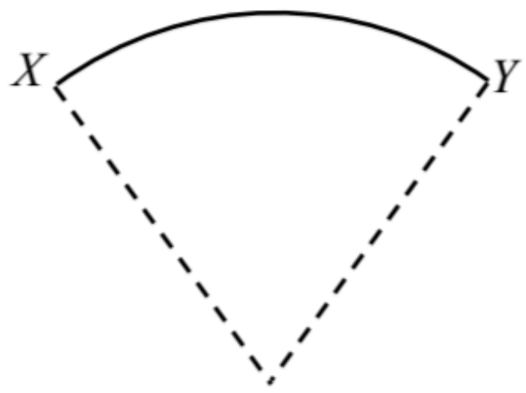
5. In the figure, *ABCDEFGH* is a regular octagon and *GHI* is a straight line.

(a) Find $\angle HAB$.

(b) Find $\angle IHB$. (6 marks)



6. In the figure, a wire is bent into the shape of a circular arc XY. It is given that the radius and the angle at centre are 18 cm and $60°$ respectively.



(a) Find the length of the wire XY in terms of π.

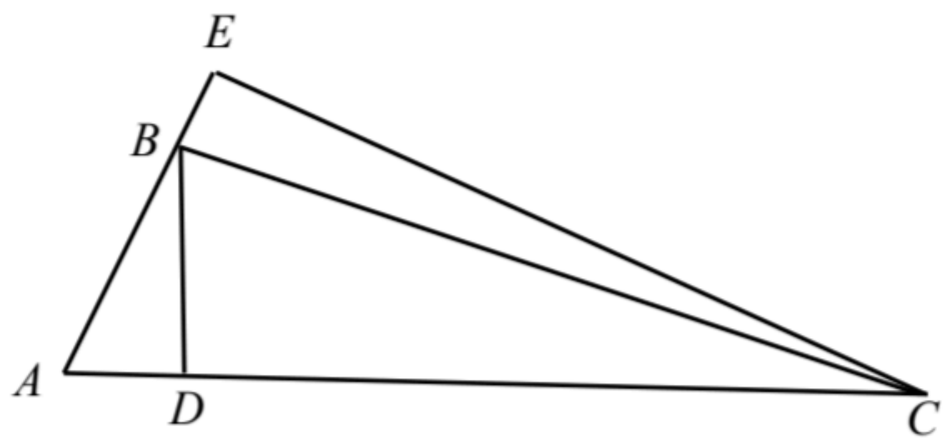
(b) The wire is now bent into a circle. Find the radius of the circle. (4 marks)

7. In the figure, ABE and ADC are straight lines. It is given that $AB = 15\,\text{cm}$, $AD = 9\,\text{cm}$, $BD = 12\,\text{cm}$ and $\angle DBC = 60°$.

(a) Prove that $BD \perp AC$.

(b) Find the length of BC.

(c) If $AE \perp EC$, find the length of EC. (7 marks)



Sample Paper

Final Examination

Form 2 Mathematics

Question-Answer Booklet for Sections C and D

Name: _____ Class: _____ Class number: _____

Instructions for Sections C and D

1. Please also read the instructions on the cover page of the question booklet for Section A.

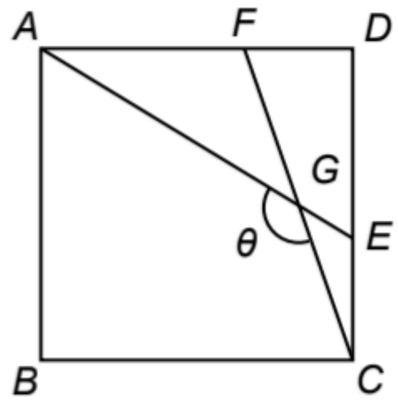
2. This question-answer booklet consists of two sections, Sections C and D. Attempt all questions in Section C, while Section D is optional.

3. The full mark for Section C is 40, and the full mark for Section D is 5.

4. In this question-answer booklet, write all your answers in the spaces provided. **Answers written in the margins will not be marked.**

Section C: Conventional Questions (40 marks)

1. In the figure, $ABCD$ is a square. E and F are points lying on CD and AD respectively such that $CE : DE = 2 : 5$ and $AF : DF = 3 : 2$. AE and CF intersect at point G.



(a) (i) Find $CD : DF$.

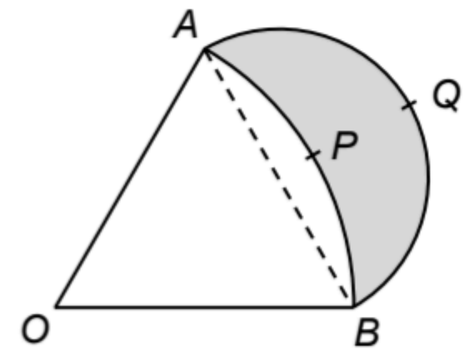
(ii) Find $\angle CFD$. (4 marks)

(b) Find θ. (4 marks)

2. In the figure, O is the centre of the sector $OAPB$. AB is the diameter of the semi-circle AQB. It is given that $OA =$ 14 cm and $\angle AOB = 60°$.

(a) Show that ΔAOB is an equilateral triangle. (3 marks)

(b) Find the area of the shaded region. (5 marks)



3. The base radius of a right circular cylindrical vessel is 17 cm. It contains some water to a depth of 10 cm. A metal cube of side 13 cm is put in the vessel and it sinks to the bottom of the vessel. It is given that there is no water overflow.

(a) (i) Find the volume of water in the vessel in term of π.

(ii) Is the metal cube totally immersed in water? Explain your answer. (5 marks)

(b) Hence, find the depth of water in the vessel after putting in the metal cube. (3 marks)

(c) Someone claims that the wet surface area of the vessel increases by at least 13 %. Do you agree? Explain your answer. (4 marks)

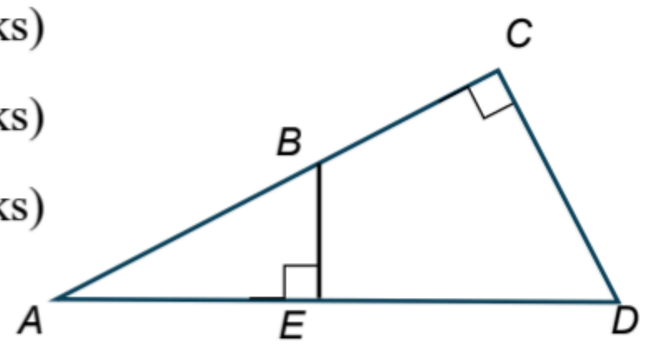
4. In the figure, AED and ABC are straight lines. It is given that $AB = CD, \angle C = 90°$ and $BE \perp AD$.

(a) (i) Prove that $\Delta ACD \sim \Delta AEB$.

(ii) Hence, show that $AE^2 + AE \times ED = AB^2 + AB \times BC$. (4 marks)

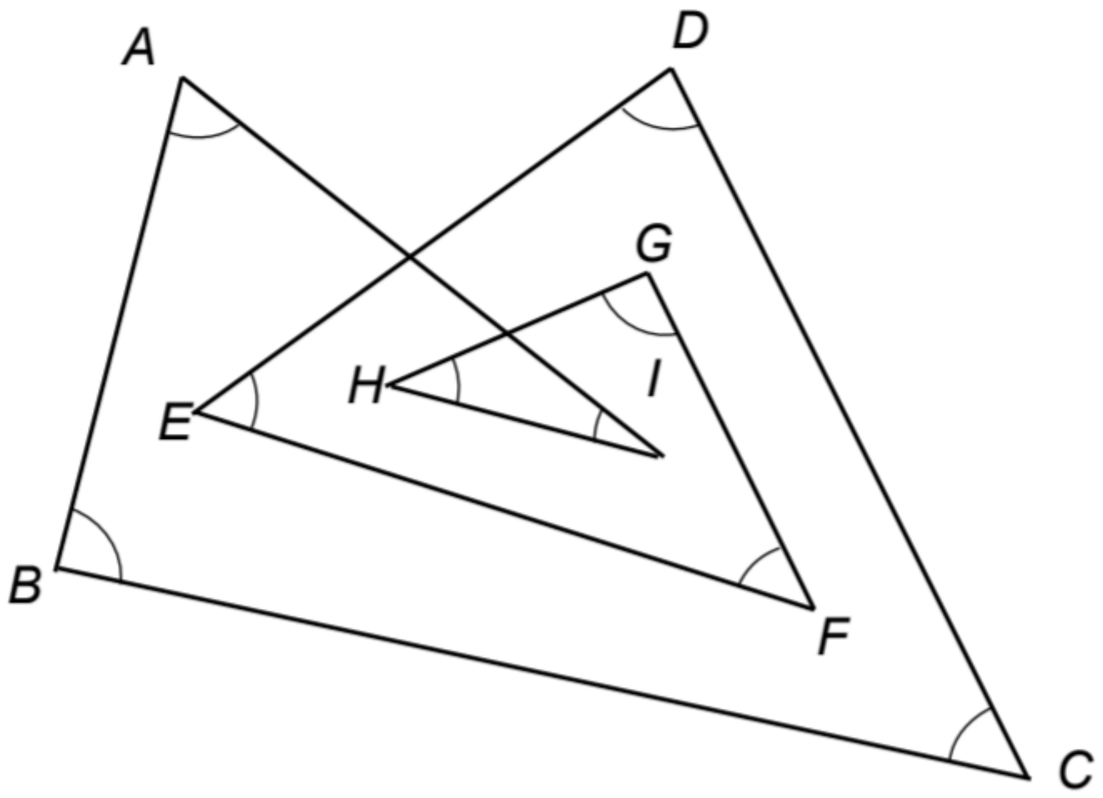
(b) Hence or otherwise, prove that $BC^2 + AE^2 = ED^2$. (4 marks)

(c) If $BC = 7$ and $CD = 5$, find DE. (4 marks)



Section D: Challenging Question (5 marks, optional)

1. Find the sum of all the marked angles. (5 marks)



END OF PAPER

Rough Work Sheet

Note : Nothing written on this sheet will be marked.