

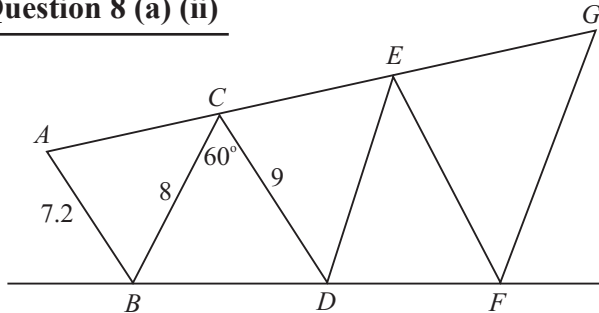
## LC 2012 (SET E): PAPER 2

### QUESTION 8 (45 MARKS)

#### Question 8 (a) (i)

A triangle in which the three sides have different lengths

#### Question 8 (a) (ii)



#### FORMULA: Enlargements

$$\text{Scale factor } k = \frac{|\text{Image length}|}{|\text{Object length}|}$$

$$k^2 = \frac{|\text{Image area}|}{|\text{Object area}|}$$

$$k = \frac{|\text{Image length}|}{|\text{Object length}|} = \frac{|CD|}{|AB|} = \frac{9}{7.2} = 1.25 \leftarrow \text{Triangle } CDE \text{ is the image of the object } ABC.$$

$$|ED| = k|BC| = 1.25(8) = 10 \text{ m}$$

$$|FG| = k|ED| = 1.25(10) = 12.5 \text{ m}$$

#### MARKING SCHEME NOTES

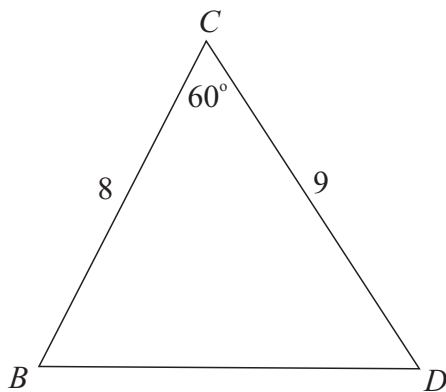
##### Question 8 (a) (i) [Scale 5B (0, 2, 5)]

- 2: • Any work of merit such as any triangle drawn with no measurement of sides indicated or defines an isosceles triangle
- 5: • A triangle drawn with three different lengths indicated

##### Question 8 (a) (ii) [Scale 15D\* (0, 4, 7, 11, 15)]

- 4: • Any work of merit e.g. an indication that  $[FG]$  is an enlargement of  $[BC]$  or  $[ED]$  or work towards scale factor
- 7: • Further work of merit such as scale factor found
- 11: • An almost complete response such as scale factor applied to  $[BC]$  to get  $[ED]$  correctly or fails to finish e.g. leaves  $|FG|$  as  $1.25^2 \times 8$  or  $1.25 \times 10$
- 15: • Correct answer without work shown

#### Question 8 (a) (iii)



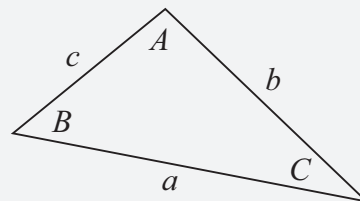
$$|BD|^2 = 8^2 + 9^2 - 2(8)(9)\cos 60^\circ = 73$$

$$\therefore |BD| = \sqrt{73} = 8.544 \text{ m}$$

#### FORMULAE AND TABLES BOOK

##### Trigonometry of the triangle:

##### Cosine rule [page 16]



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

**MARKING SCHEME NOTES**

**Question 8 (a) (iii) [Scale 15D\* (0, 4, 7, 11, 15)]**

- 4: • Any work of merit such as identifying the cosine rule as a method of solution  
 7: • Further work of merit such as significant correct substitution into the cosine formula  
 11: • An almost complete response such as cosine rule worked to  $\sqrt{73}$ .  
 • Correct answer without work shown

**Question 8 (a) (iv)**

If you work the lines  $AG$  and  $BF$  back they will meet at  $O$ , the centre of the enlargement.

Triangle  $ODC$  is the image of triangle  $OBA$ .

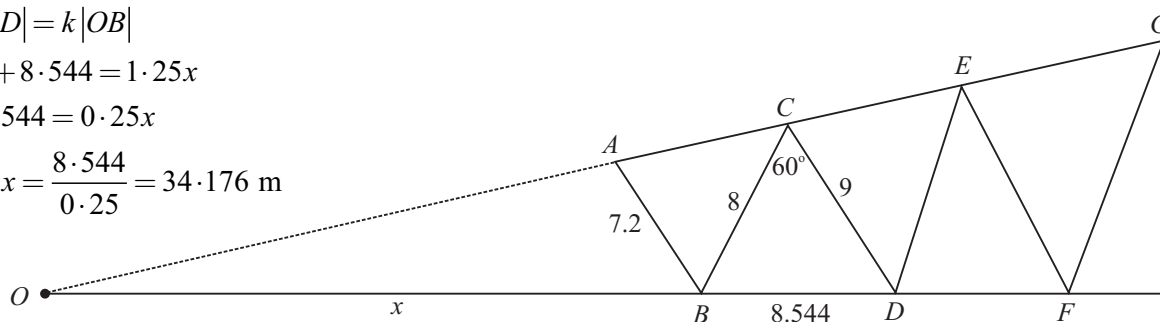
Call  $x$ , the distance  $OB$ .

$$|OD| = k|OB|$$

$$x + 8.544 = 1.25x$$

$$8.544 = 0.25x$$

$$\therefore x = \frac{8.544}{0.25} = 34.176 \text{ m}$$

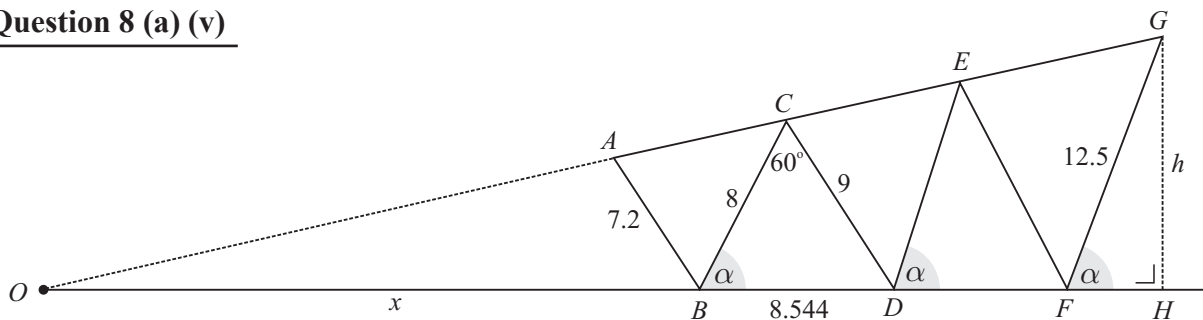


**MARKING SCHEME NOTES**

**Question 8 (a) (iv) [Scale 5B\* (0, 2, 5)]**

- 2: • Any work of merit such as an effort at finding or explaining the centre of enlargement  
 or an effort at the use of the scale factor to find the centre of enlargement  
 • Correct answer without work shown

**Question 8 (a) (v)**



Apply the Sine rule on triangle  $BCD$  to find  $\sin \alpha$ :

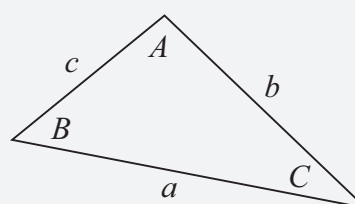
$$\frac{\sin \alpha}{9} = \frac{\sin 60^\circ}{8.544}$$

$$\sin \alpha = \frac{9 \sin 60^\circ}{8.544}$$

**FORMULAE AND TABLES BOOK**

**Trigonometry of the triangle:**

[page 16]



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

Triangle  $GHF$  is a right-angled triangle. Find  $\sin \alpha$ :

$$\sin A = \frac{\text{Opposite}}{\text{Hypotenuse}}$$

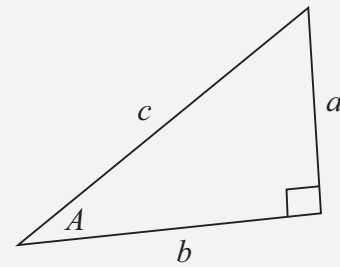
$$\sin \alpha = \frac{h}{12.5}$$

$$\therefore \frac{9 \sin 60^\circ}{8.544} = \frac{h}{12.5}$$

$$\therefore h = \frac{12.5 \times 9 \sin 60^\circ}{8.544} = 11.4 < 11.6 \text{ m}$$

The plan meets the condition.

**FORMULAE AND TABLES BOOK**  
**Trigonometry: Right-angled triangle** [page 16]



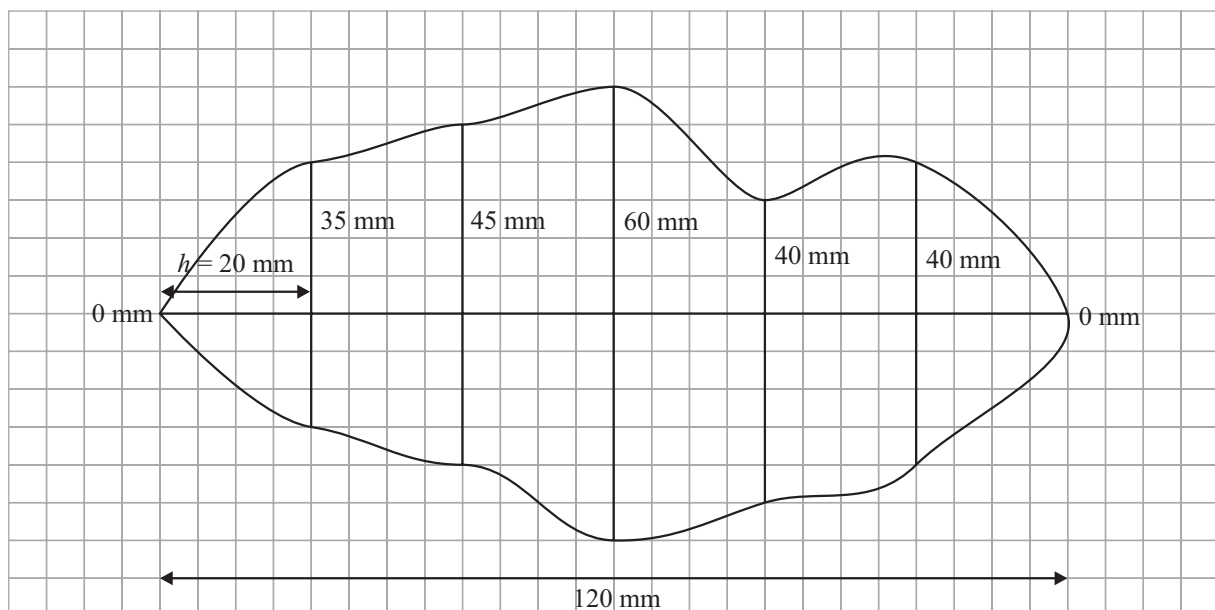
$$\sin A = \frac{a}{c}, \cos A = \frac{b}{c}, \tan A = \frac{a}{b}$$

### MARKING SCHEME NOTES

#### Question 8 (a) (v) [Scale 10D (0, 2, 5, 8, 10)]

- 2: • Any work of merit e.g. vertical height indicated (from point  $G$  or in triangles  $CBD$ ,  $EDF$ ) or correct relevant formula identified or  $|FG| = 12.5$   
 • Correct answer without work shown
- 5: • Further work of merit such as  $\alpha$  or  $\sin \alpha$  found
- 8: • An almost complete response whereby  $h$  is found but no conclusion is given

#### Question 8 (b) (i)



### MARKING SCHEME NOTES

#### Question 8 (b) (i) [Scale 10C\* (0, 4, 7, 10)]

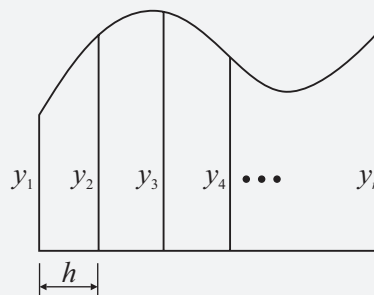
- 4: • Any work of merit such as one or two correct measurements shown  
 • If (b) (i) not done but at least one correct measurement is shown in (b) (ii)
- 7: • An almost complete response such as an incomplete plot with one/two elements missing or incorrect or no key indicated

**Question 8 (b) (ii)**

$$h = 20 \text{ mm}$$

$$\begin{aligned} A &= \frac{20}{2} [0 + 0 + 2(35 + 45 + 60 + 40 + 40)] \\ &= 10[440] \\ &= 4400 \text{ mm}^2 \end{aligned}$$

**FORMULAE AND TABLES BOOK**  
**Area approximations [page 12]**



$$A \approx \frac{h}{2} [y_1 + y_n + 2(y_2 + y_3 + y_4 + \dots + y_{n-1})]$$

**MARKING SCHEME NOTES****Question 8 (b) (ii) [Scale 15D\* (0, 4, 7, 11, 15)]**

- 4:**
- Any work of merit such as a correct substitution of  $h$ ,  $F + L$  or OTHERS
  - Correct answer without work shown
- 7:**
- Further work of merit such as two correct substitutions of  $h$ ,  $F + L$  or OTHERS.
  - One correct substitution followed by some correct calculation
- 11:**
- An almost correct response such as fully correct substitution followed by an error in calculation
  - Two correct substitutions followed by fully correct calculation