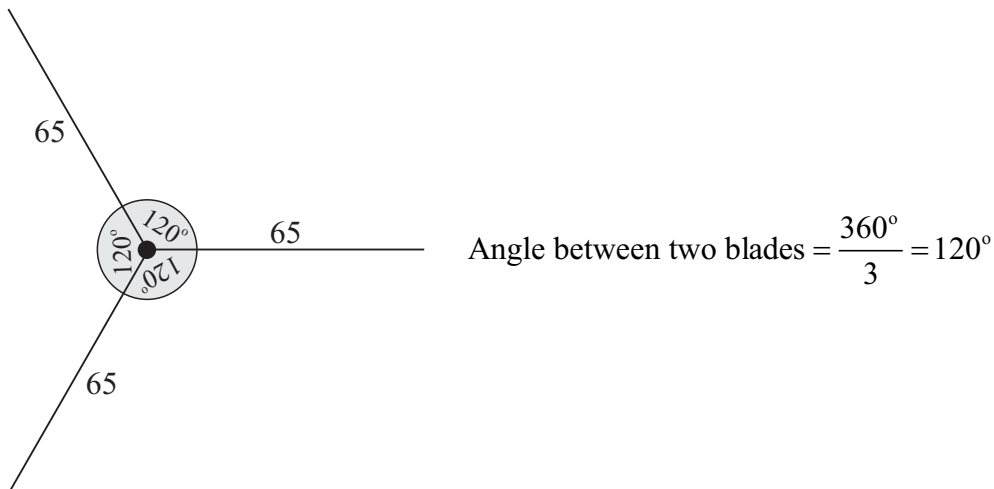


LC 2014 (SET C): PAPER 2

QUESTION 8 (50 MARKS)

Question 8 (a) (i)

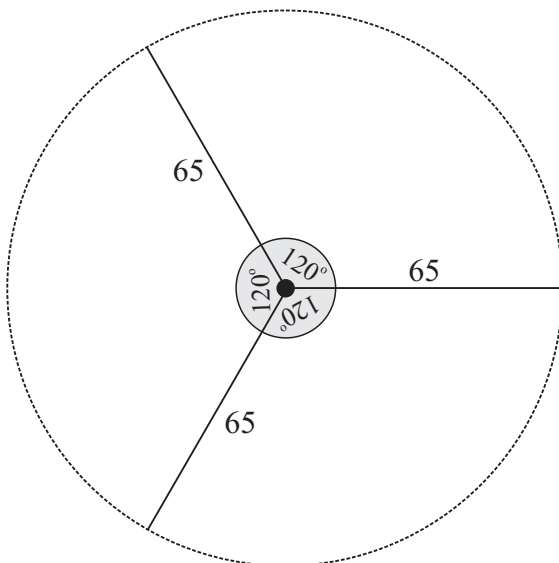


MARKING SCHEME NOTES

Question 8 (a) (i) [Scale 10B (0, 5, 10)]

- 5: • Any work of merit. e.g. Joins tips of blades or draws circle on diagram
 10: • Accept a correct answer without work (240°)

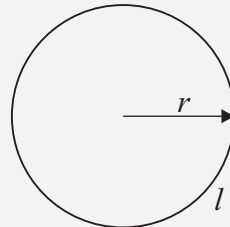
Question 8 (a) (ii)



FORMULAE AND TABLES BOOK

Length and area:

Circle [page 8]



$$l = 2\pi r$$

$$A = \pi r^2$$

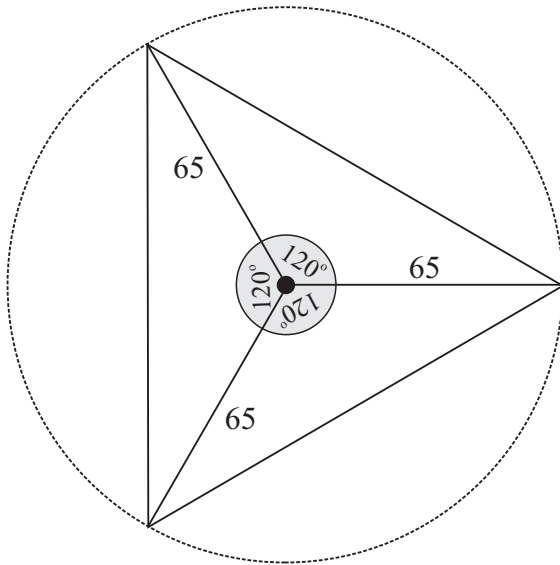
$$\text{Area} = \pi(65)^2 \approx 13\,273 \text{ m}^2$$

MARKING SCHEME NOTES

Question 8 (a) (ii) [Scale 10C (0, 4, 7, 10)]

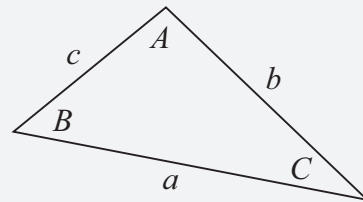
- 4: • Writes the correct formula.
 • Identifies the radius correctly ($r = 65$)
 7: • A fully correct substitution
 • Calculates the area of circle with one incorrect substitution
 • Answer left in terms of π
 10: • Accept a correct answer without work

Question 8 (a) (iii)

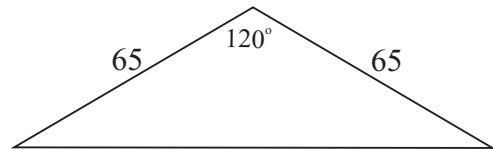


**FORMULAE AND TABLES BOOK
Trigonometry of the triangle:**

[page 16]



Area: $\frac{1}{2} ab \sin C$



Area = $3(\frac{1}{2}(65)(65) \sin 120^\circ) \approx 5488 \text{ m}^2$

Question 8 (a) (iv)

There are 15 rotations per minute, 60 minutes in an hour, 24 hours in a day, 365 days in a year, 25 years in a lifetime and it operates 31% of the time.

Number of rotations = $15 \times 60 \times 24 \times 365 \times 25 \times 0.31 = 61\,101\,000 = 6.11 \times 10^7$

CALCULATOR [Casio fx-85GT PLUS]

Input $15 \times 60 \times 24 \times 365 \times 25 \times 0.31$

Press =

Press Shift Mode

Press 7: Sci

Press 3

MARKING SCHEME NOTES

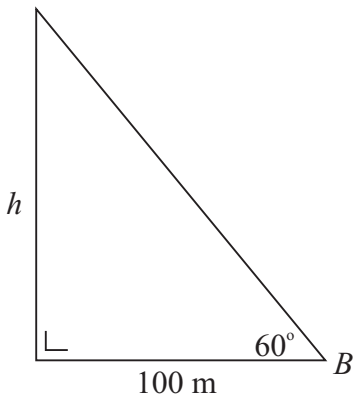
Question 8 (a) (iii) [Scale 5C (0, 3, 4, 5)]

- 3:
 - Writes a correct formula for area of a triangle
 - Some correct substitution into a correct relevant formula [Radius = 65, $\theta = 120^\circ$]
 - Any work of merit such as a triangle drawn in this section with the tips of blades joined
- 4:
 - Fully correct or consistent substitution e.g. $3(\frac{1}{2} \times 65^2 \sin 120^\circ)$
 - Calculates the area of the triangle with one incorrect substitution
 - Incorrect calculator mode (Once only) [Rad = 3680, Grad = 6027]
- 5:
 - Accept a correct answer without work

Question 8 (a) (iv) [Scale 10B (0, 5, 10)]

- 5:
 - Any work of merit in the determination of working life or number of rotations e.g. $25(0.31)$ or $365(24)(60)15$
- 10:
 - A correct answer

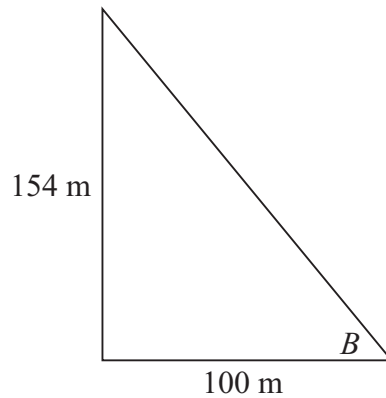
Question 8 (b)



$$\tan 60^\circ = \frac{h}{100}$$

$$\therefore h = 100 \tan 60^\circ \approx 173\text{ m}$$

Question 8 (c) (i)

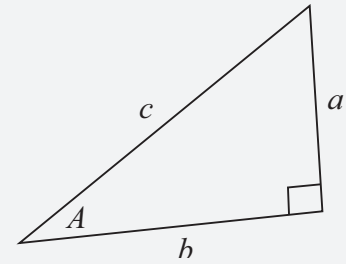


$$\tan B = \frac{154}{100}$$

$$\therefore B = \tan^{-1}\left(\frac{154}{100}\right) \approx 57^\circ$$

FORMULAE AND TABLES BOOK

Trigonometry: Right-angled triangle [page 16]



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

Question 8 (c) (ii)

FORMULA: % ERRORS

Absolute error in a quantity = |Measured value of quantity – Accepted value of quantity|

Percentage error in a quantity = $\frac{\text{Absolute error in quantity}}{\text{Accepted value of quantity}} \times 100\%$

$$\% \text{ error} = \left(\frac{60^\circ - 57^\circ}{57^\circ} \right) \times 100\% \approx 5.3\%$$

MARKING SCHEME NOTES

Question 8 (b) [Scale 5C (0, 3, 4, 5)]

- 3: • Any correct relevant work such as a trigonometric ratio or the Sine Rule identified.
• Any correct additional information identified in given triangle
- 4: • Correct substitution. i.e. $[\tan 60^\circ = \frac{h}{100}]$
• Calculates the height with one incorrect substitution
- 5: • Accept a correct answer without work

Question 8 (c) (i) [Scale 5C (0, 3, 4, 5)]

- 3: • Any work of merit involving Pythagoras Theorem, tan ratio or identification of a right angled triangle
- 4: • Correct substitution into formula or $|\angle B| = \tan^{-1}\left(\frac{154}{100}\right)$.
• Calculates $|\angle B|$ with one incorrect substitution
- 5: Accept a correct answer without work

Question 8 (c) (ii) [Scale 5C (0, 3, 4, 5)]

- 3: • Any work of merit. e.g. Calculates the size of the error or writes % error formula
- 4: • A fully correct substitution $\left(\frac{3}{57} \times 100\right)$.
• Calculates the % error with one incorrect substitution