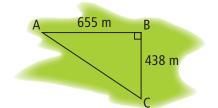
MATHEMATICS AND **S**TATISTICS **1.6**

Externally assessed 4 credits

Apply geometric reasoning in solving problems Online practice assessment task

Question 1

a. A cross-country running course is in the shape of a rightangled triangle, ABC as shown.



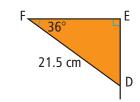
The distance AB is 655 m and the distance BC is 438 m.

i. What is the length of AC?

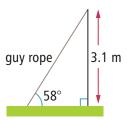
ii. What is the size of the angle BAC?

c. A triangular plastic track marker DEF has length DF = 21.5 cm and angle DFE = 36° .

Find the length EF.

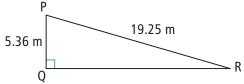


d. A post of height 3.1 m is held up by a guy rope, which makes an angle of 58° with the ground.



What is the length of the guy rope?

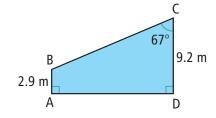
b. The cross-section of a spectator stand is also in the shape of a right-angled triangle, PQR, as shown.



The length PQ is 5.36 m and the length PR is 19.25 m. Find the length QR.



e. The side view of the sports pavilion is shaped as shown below,



where AB = 2.9 m, CD = 9.2 m and $\angle BCD = 67^{\circ}$.

Find the length of the roof section, BC.

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Achievement Standard 91031 (Mathematics and Statistics 1.6) Online practice assessment task

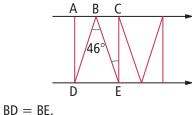
Question 2

- a. Mandy is a jewellery designer. She is designing a series of patterns for rings. The edges of the patterns are parallel.
 - i. The pattern below is based on the letter M.

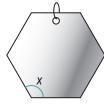
CE is perpendicular to AC.

Calculate the size of angle BEC.

Angle DBE = 46° .



b. Mandy designs silver earrings in the shape of a regular hexagon.

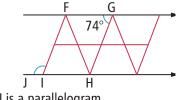


i. Find the size of the angle marked *x*. Give reasons.

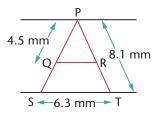
Mandy cuts out her earrings from a sheet of silver.

ii. Give a practical reason for her choice of polygon.

ii. The pattern below is based on the letter A.



FGHI is a parallelogram. Angle FGH = 74° . Calculate the size of angle FIJ. c. The letter A in Mandy's design is symmetrical and has dimensions as shown.



PQ = 4.5 mm.

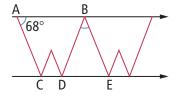
PT = 8.1 mm.

ST = 6.3 mm.

Calculate the length of QR.

You must give a geometric reason for each step leading to your answer.

iii. The letter W in the border pattern below has line symmetry.

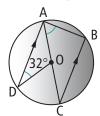


Angle BAC = 68° Calculate the size of angle DBE.

Achievement Standard 91031 (Mathematics and Statistics 1.6) Online practice assessment task

Question 3

a. Aroha designs circular earrings with geometric designs.

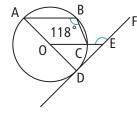


AC is the diameter of the circle, centre O. Angle ADO = 32° . AD is parallel to BC.

Calculate the size of angle BAC.

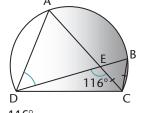
You must give a geometric reason for each step leading to your answer.

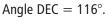
c. In the figure below, AD is a diameter of a circle centre O. DF is a tangent to the circle at D.



Angle ABC = 118°. Calculate angle CEF. You must give a geometric reason for each step leading to your answer.

b. Aroha's new brooch design is in the shape of a circle with a segment cut off.





EC = BC.

Calculate the size of angle ADE.

You must give a geometric reason for each step leading to your answer.



Answers

| Answers |
|--|
| Question 1 a. i. 788 m (3 s.f.) ii. 33.8° b. 18.49 m (2 d.p.) c. 17.4 cm d. 3.7 m (2 sig. fig.) e. 16.1 m (1 d.p.) |
| Question 2 |
| a. i. 23° ii. 106° iii. 44° |
| b. i. Interior \angle sum hexagon = (6 – 2) \times 180 |
| = 720° |
| Each interior angle $=\frac{720}{6}$ |
| $x = 120^{\circ}$ |
| ii. Hexagons tessellate, so can be cut without |
| waste (except at edges of sheet) |
| c. By symmetry, \triangle PQR and \triangle PST are similar, so sides are in proportion. |
| Sides in \triangle PST are $\frac{8.1}{4.5} = 1.8$ times the length of sides in \triangle PQR. |
| $QR = \frac{6.3}{8.1} \qquad \frac{ST}{8.1}$ |
| = 3.5 mm |
| Question 3 |
| a. $\angle OAD = 32^{\circ}$ (base $\angle s$ isos \triangle) |
| $\angle ACB = 32^{\circ}$ (alt $\angle s //$ lines) |
| $\angle ABC = 90^{\circ}$ (\angle in a semi) |
| $\angle BAC = 58^{\circ} (\angle sum \Delta)$ |
| b. $\angle BEC = 64^{\circ}$ ($\angle s$ on a line) |
| $\angle \text{EBC} = 64^{\circ}$ (base $\angle s$ isos \triangle) |
| $\angle ECB = 52^{\circ} (\angle sum \Delta)$ |
| |

- $\angle ADE = 52^{\circ}$ ($\angle ADB$ and $\angle ACB$ on same arc AB)
- **c.** Reflex $\angle AOC = 236^{\circ}$ (\angle at centre = 2 × \angle at circumf)
 - $\angle DOC = 56^{\circ}$ (AOD is straight angle)
 - $\angle ODE = 90^{\circ}$ (radius perp to tangent)
 - $\angle CEF = 146^{\circ}$ (ext \angle triangle)