

1. Solve

(a) $4x^2 + 4x - 3 = 0$

(b) $21 - 4x - x^2 = 0$

2. Solve $2x^2 - 3x - 1 = 0$, giving the roots correct to 1 decimal place.

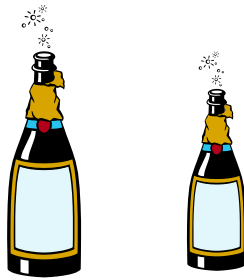
3. Simplify:

(a) $\frac{4x^2 - 8xy}{4x}$

(b) $\frac{5a - 15}{2a^2 - 5a - 3}$

4. The two bottles of champagne shown below are mathematically similar. If the cost of the champagne depends on the volume of the contents, find the cost of the smaller bottle if the larger one costs £44.80.

The height of the smaller bottle is 36 cm and the height of the larger one is 48 cm.



5. (a) Do a five-figure summary for the data shown below.

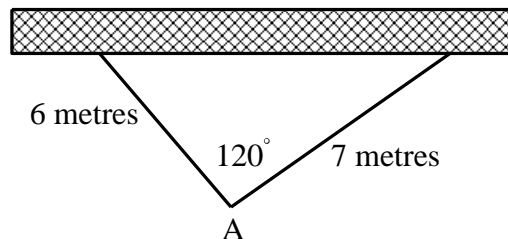
8 13 17 23 24 27 29 31 35 39 40 43

(b) Draw a box-plot to show your results for part (a).

(c) Find the range.

(d) Find the semi-interquartile range.

6. The Addams family wants to fence off a triangular part of their garden for their pet rattlesnake. They have a long straight wall available and two straight pieces of fencing 6 metres and 7 metres in length. They first erect the fencing as shown below.

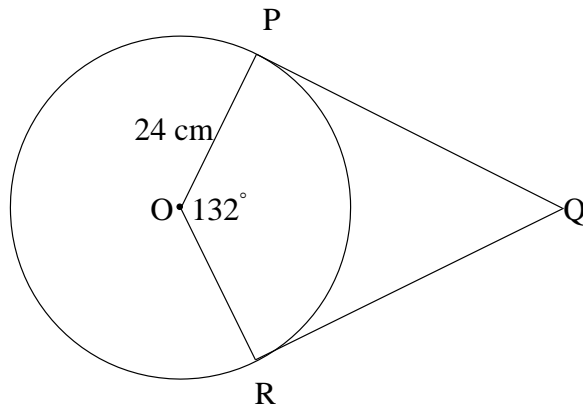


(a) Find the area enclosed by the wall and the two pieces of fencing.

(b) What size should they make angle A to maximise the area of the triangle? Justify your answer.

7. OPQR is a tangent kite to the circle, radius 24 cm and centre O.
 $\angle POR = 132^\circ$.

- (a) Calculate the perimeter of the kite.
 (b) Calculate the area of the kite.



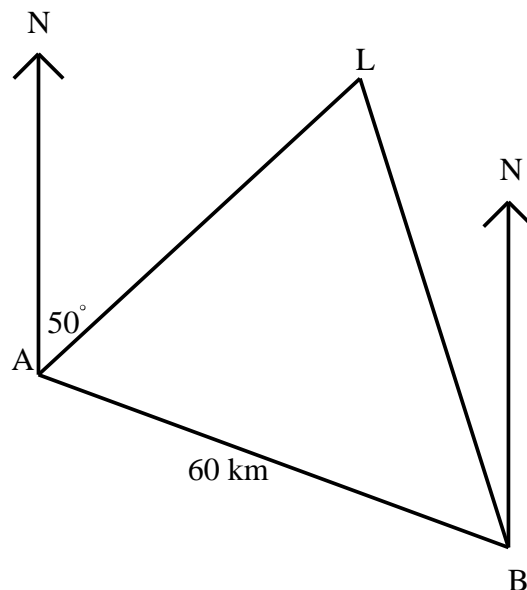
8. The depth of water in a harbour is given by the formula

$$D = 10 + 5 \sin(30t)^\circ,$$

where D is the depth in metres and t is the number of hours after midnight on Sunday.

- (a) State the maximum and minimum values of D .
 (b) Calculate the depth of water in the harbour at 2 p.m. on Monday afternoon.
 (c) At what time is “low water” on Monday morning?

9. A ship is at position A.
 Lighthouse L is on a bearing of 050° from the ship.



The ship then travels 60 kilometres on a bearing of 130° to position B.
 From position B the captain observes the lighthouse on a bearing of 340° .
 Calculate the distance between the ship and the lighthouse when the ship is at position B.