Math 4 SN   Name : _____
Distance, Midpoint, Point of Division Practice

Show all work in your copybooks.

1 Points P(624, 36) and Q(956, 86) are the end points of one of the diameters of a circle.

What are the coordinates of the centre of this circle?

2 While out walking, Ben and Gabriella stopped abruptly when a skunk crossed their path. They ran in opposite directions, each running the same distance before coming to a stop.

On an imaginary Cartesian plane, Ben would be stopped at the point (23, 35) and Gabriella would be stopped at the point (-54, 17).

What are the coordinates of the point at which they first would have seen the skunk?

3 Luke wants to cut a piece of metal into the shape of a trapezoid. To draw the outline of this piece, he uses a software program that shows only the first quadrant of the Cartesian plane, scaled in centimetres.

The metal piece is represented by the shaded region to the right.

What is the perimeter of the piece of metal?
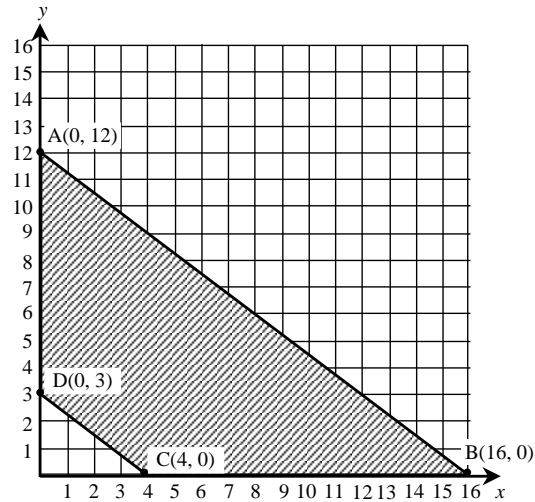
4 In a Cartesian plane, the coordinates of the vertices of triangle ABC are A(1, 1), B(7, 1) and C(9, 7). The median AM is also drawn.
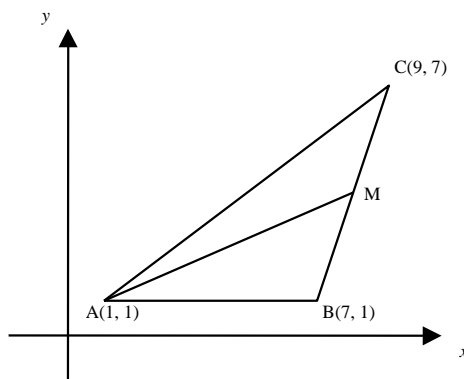
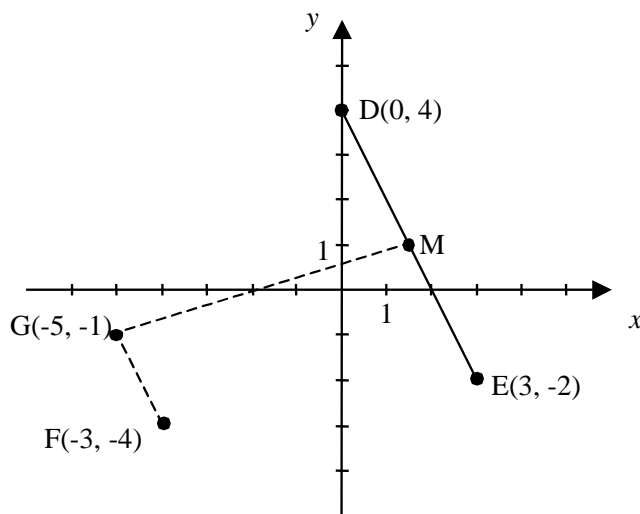What is the perimeter of triangle AMB?

5   The water main in a new residential development must be made longer. The town surveyor drew the new part of the water main on a Cartesian plane, where

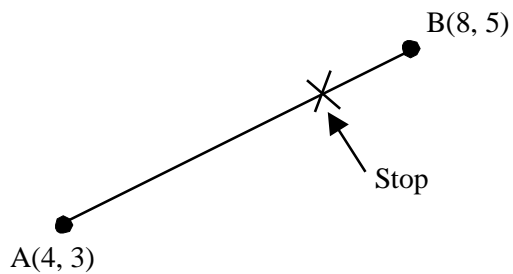 $\overline{DE}$ represents the existing water main
   M is the midpoint of $\overline{DE}$
   $\overline{FG}$ and $\overline{GM}$ represent the new water main

Rounded to the nearest tenth, what is the total length of the new water main, FGM?

6   The following diagram shows a task that has to be done on an automobile driving test.

The instructor locates a stop sign $\frac{3}{4}$ of the way from A along segment AB.

What are the coordinates of the point that represents the location of the stop sign?

Answers

1   The coordinates of the centre of this circle are (790, 61).
Note: Give 2 marks if only one of the two coordinates is correct.

2   (-15.5, 26)

3   Example of an appropriate solution

Perimeter of figure ABCD

$m\ \overline{AB} = \sqrt{(16-0)^2 + (0-12)^2}$
$= \sqrt{400}$
$= 20$

$m\ \overline{BC} = 16 - 4$
$= 12$

$m\ \overline{CD} = \sqrt{(4-0)^2 + (0-3)^2}$
$= \sqrt{25}$
$= 5$

$m\ \overline{DA} = 12 - 3$
$= 9$

Perimeter ABCD
$= 20 + 12 + 5 + 9$
$= 46$
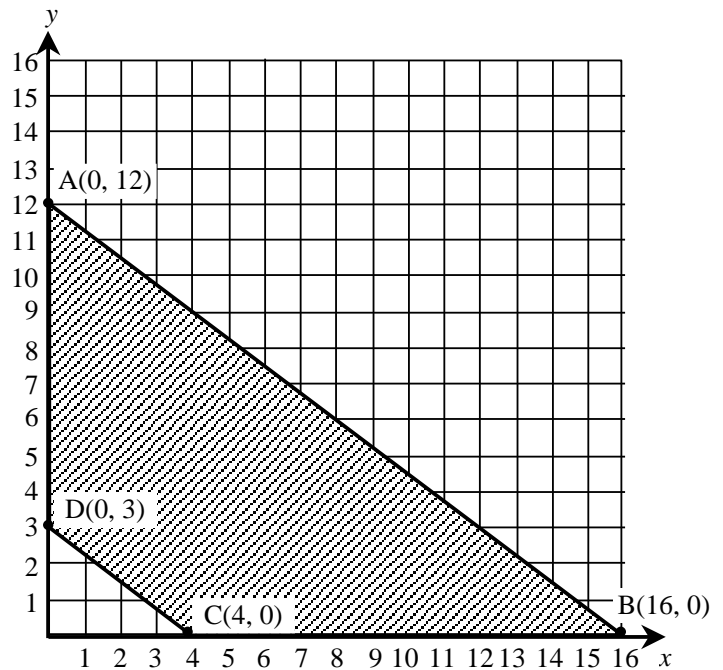
Answer   The perimeter of the piece of metal is 46 cm.

Example of an appropriate solution

Coordinate of midpoint M of $\overline{BC}$

$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$M\left(\frac{9 + 7}{2}, \frac{7 + 1}{2}\right)$$

M(8, 4)

Measure of segments AM, MB and AB

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

With A(1, 1) and M(8, 4)

$$m\ \overline{AM} = \sqrt{(8 - 1)^2 + (4 - 1)^2} = \sqrt{7^2 + 3^2} = \sqrt{58}$$
$$\approx 7.62$$

With M(8, 4) and B(7, 1)

$$m\ \overline{MB} = \sqrt{(8 - 7)^2 + (4 - 1)^2} = \sqrt{1^2 + 3^2} = \sqrt{10}$$
$$\approx 3.16$$
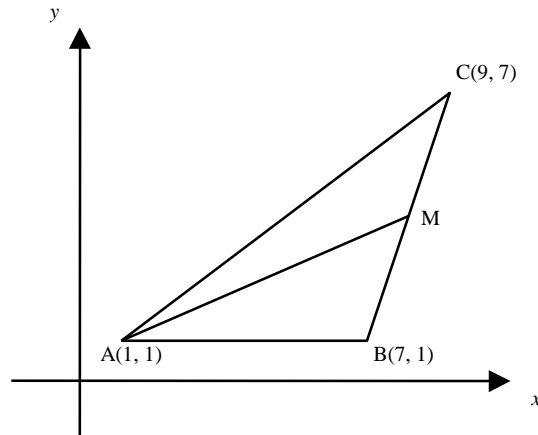
With A(1, 1) and B(7, 1)

$$m\ \overline{AB} = 6$$

Perimeter of $\triangle$AMB

$$(7.62 + 3.16 + 6) = 16.78$$

Final answer   The perimeter of triangle AMB is 16.78 units.

Accept any answer in the interval [16, 17].

Work : (example)

Measure of segment FG :

$$m\ \overline{FG} = \sqrt{(-1-(-4))^2 + (-5-(-3))^2} = \sqrt{13}$$

$$m\ \overline{FG} \approx 3.605\ 55$$

Co-ordinates of M : $\left(\dfrac{0+3}{2}, \dfrac{4+(-2)}{2} \right) = \left(\dfrac{3}{2}, 1 \right)$

Measure of segment GM :

$$m\ \overline{GM} = \sqrt{(1-(-1))^2 + \left(\dfrac{3}{2} - (-5)\right)^2} = \sqrt{46.25}$$

$$m\ \overline{GM} \approx 8.800\ 74$$

Length of new water main :

$$m\ \overline{FG} + m\ \overline{GM} = 10.406\ 29$$

Result   Rounded to the nearest tenth, the length of the new water main FGM is 10.4.

Final answer   The coordinates of the point that represents the location of the stop sign are (7, 4.5).