Length and Mid-points of Line Segments Exam Practice

Q1. a) State the co-ordinates of the mid-point of the line segment which joins the points (-3, 5) and (11, -21)

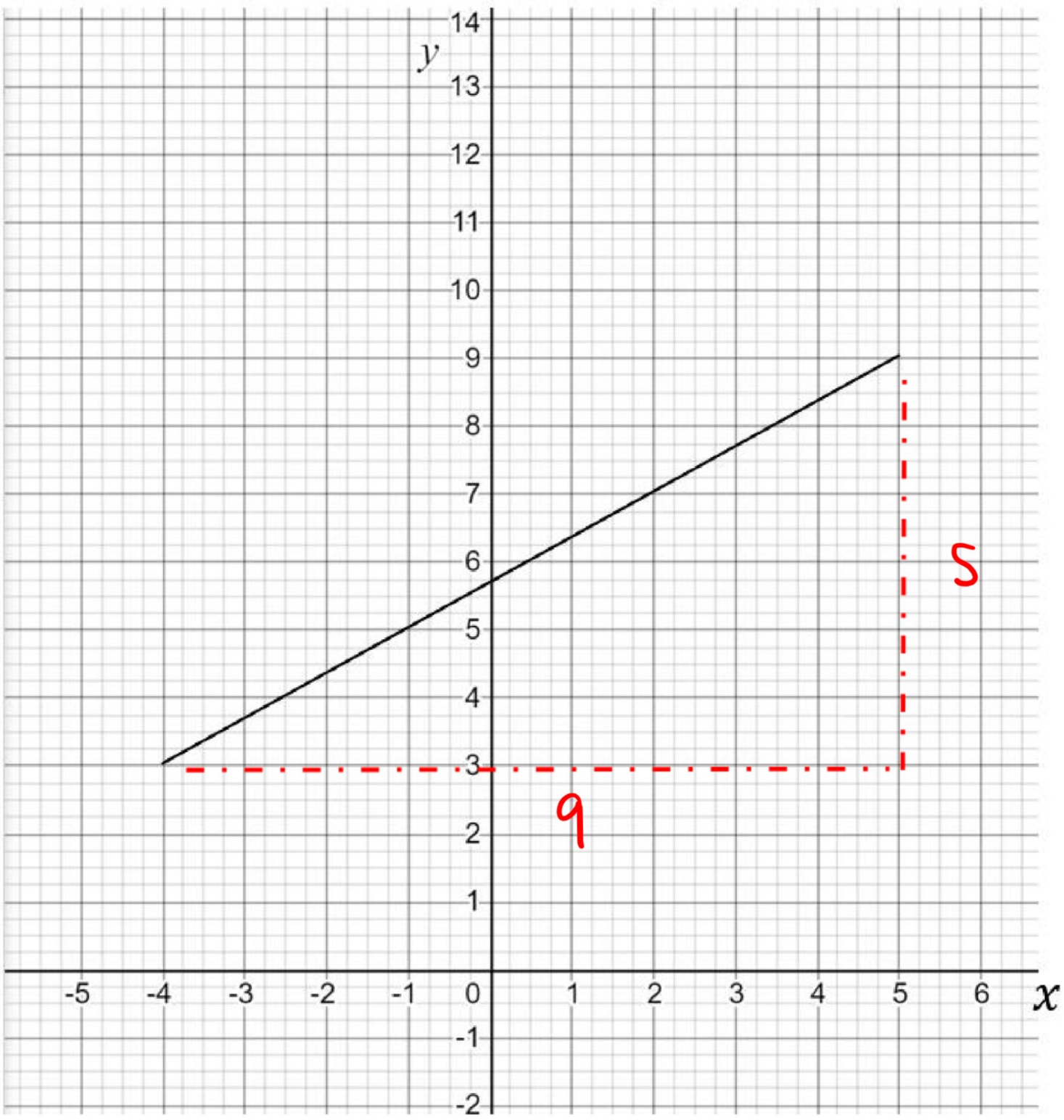
$$M = \left(\frac{-3+11}{2}, \frac{5-21}{2}\right)$$

$$= \left(\frac{8}{2}, \frac{-16}{2}\right)$$

Answer: (4, -8)

(2 marks)

b) Work out the length of the line segment correct to 1 decimal place.



$$\text{length} = \sqrt{9^2+5^2}$$

$$= \sqrt{106}$$

$$= 10.295\ldots$$

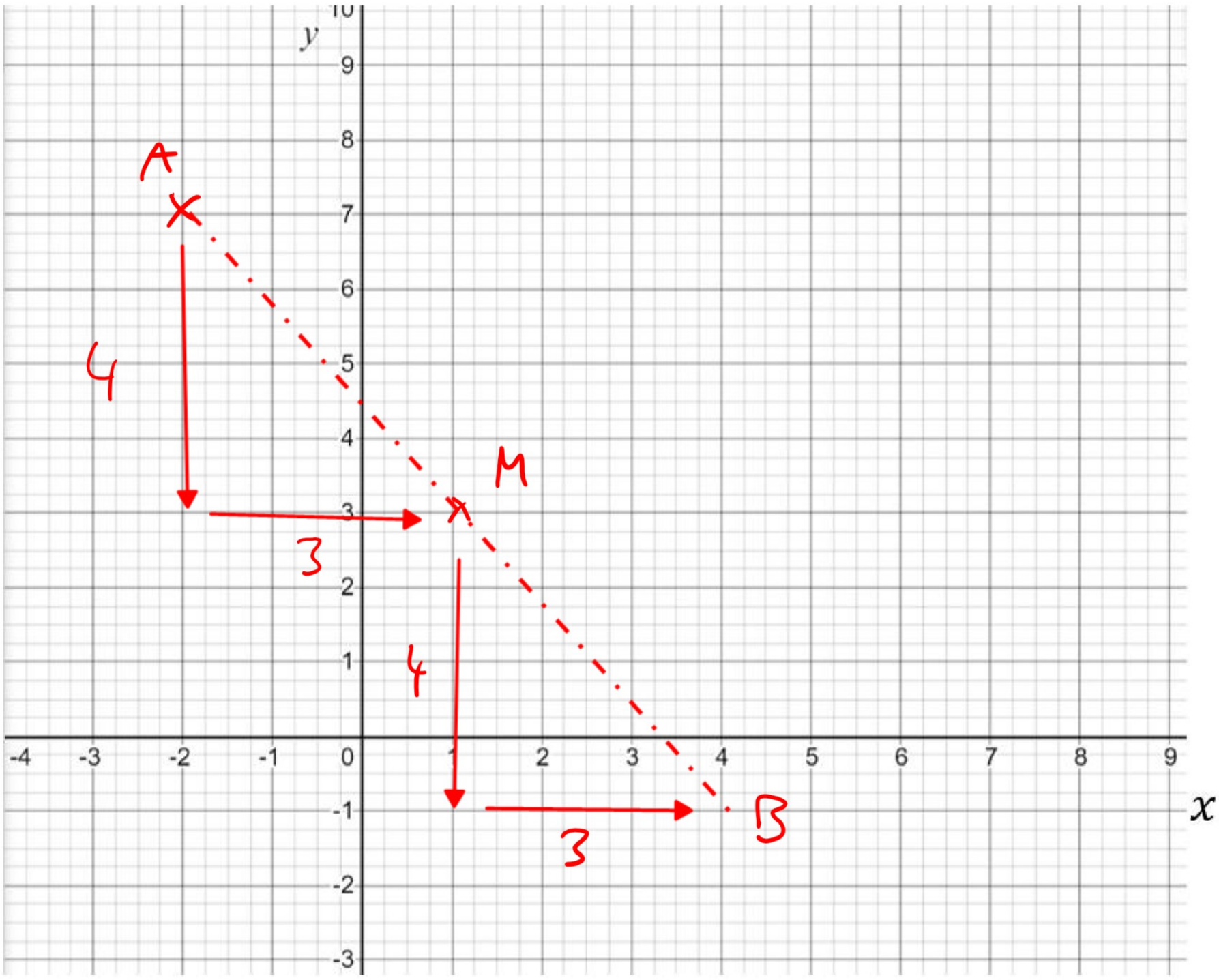
Answer: 10.3

(3 marks)

Q2. a) A line segment AB has an end-point A = (-2,7) and M = (1,3) where M is the mid-point of AB. Draw AB on the grid.

Answer: B = (4, -1)

(2 marks)



b) Work out the length of AB correct to 1 decimal place.

$\text{length} = \sqrt{8^2 + 6^2}$

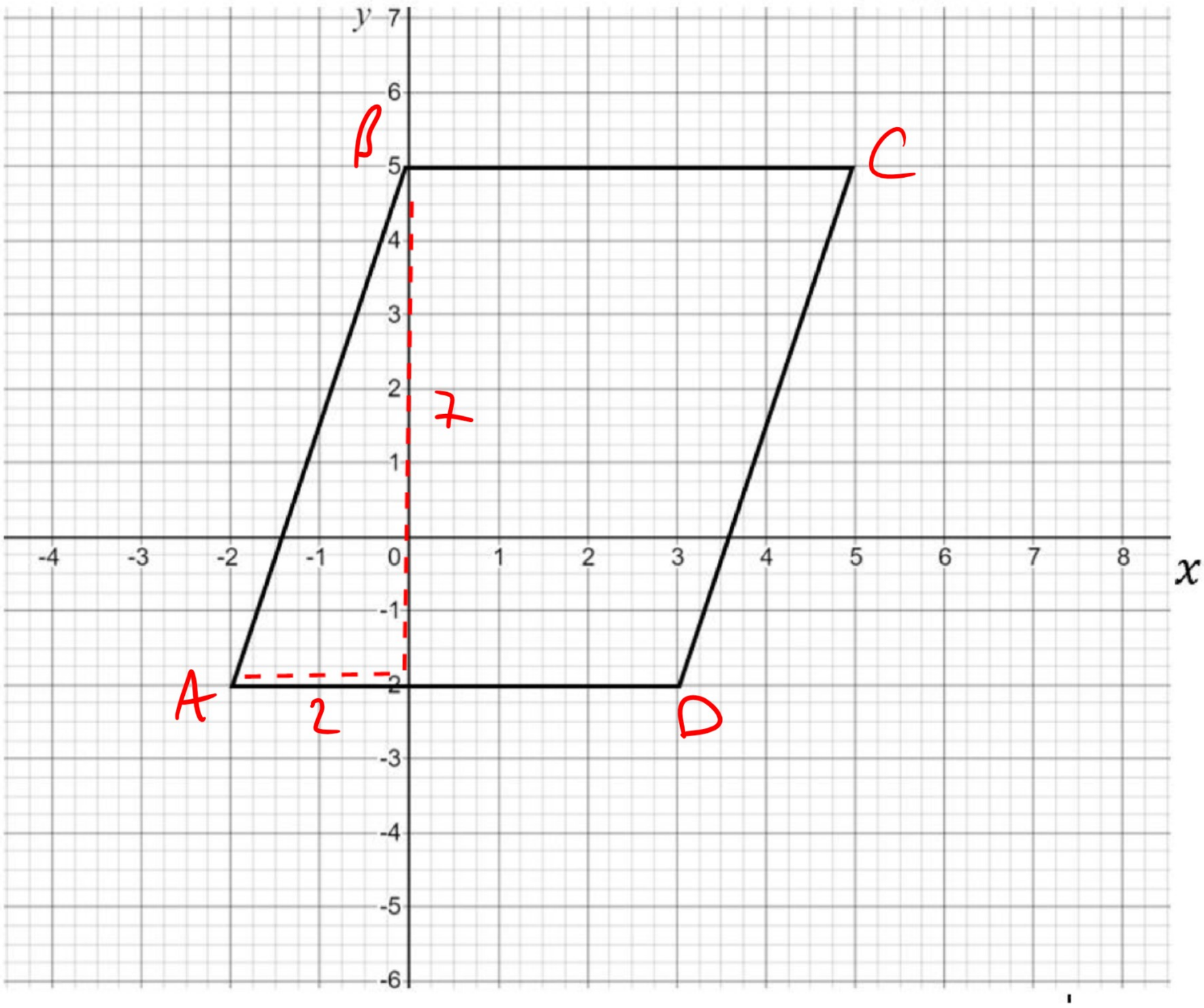
$= \sqrt{100}$

$= 10$

Answer: 10.0

(3 marks)

Q3. Work out the perimeter of the parallelogram shown, giving your answer to 1 decimal place.



• Length $AB = \sqrt{2^2 + 7^2}$ • $AD = 5$

$= \sqrt{53}$

• Perimeter $= 2 \times \sqrt{53} + 2 \times 5$

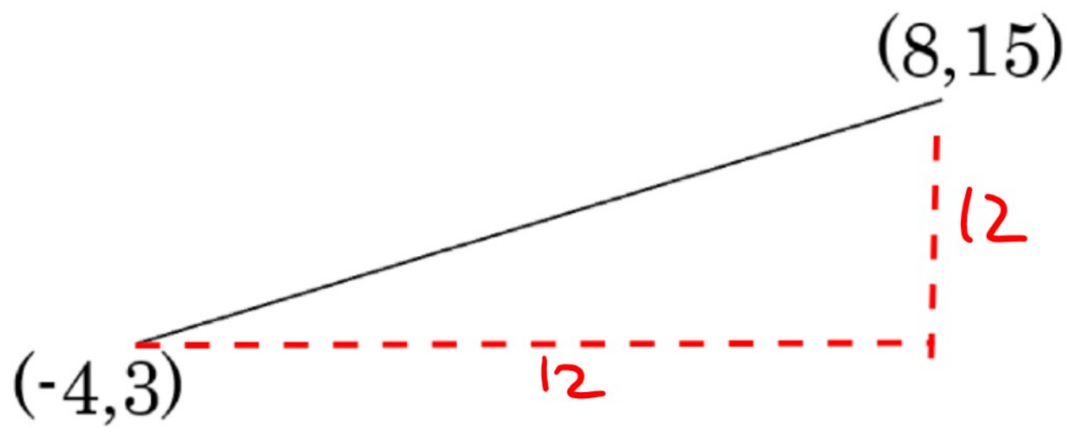
$= 2\sqrt{53} + 10$

$= 24.56...$

Answer: 24.6

(4 marks)

Q4. a) Work out the mid-point of the line segment shown:



$M = \left(\frac{-4+8}{2}, \frac{3+15}{2}\right)$

$= \left(\frac{4}{2}, \frac{18}{2}\right)$

Answer: (2, 9)

(2 marks)

b) Find the length of the line segment correct to 1 decimal place.

$AB = \sqrt{12^2 + 12^2}$

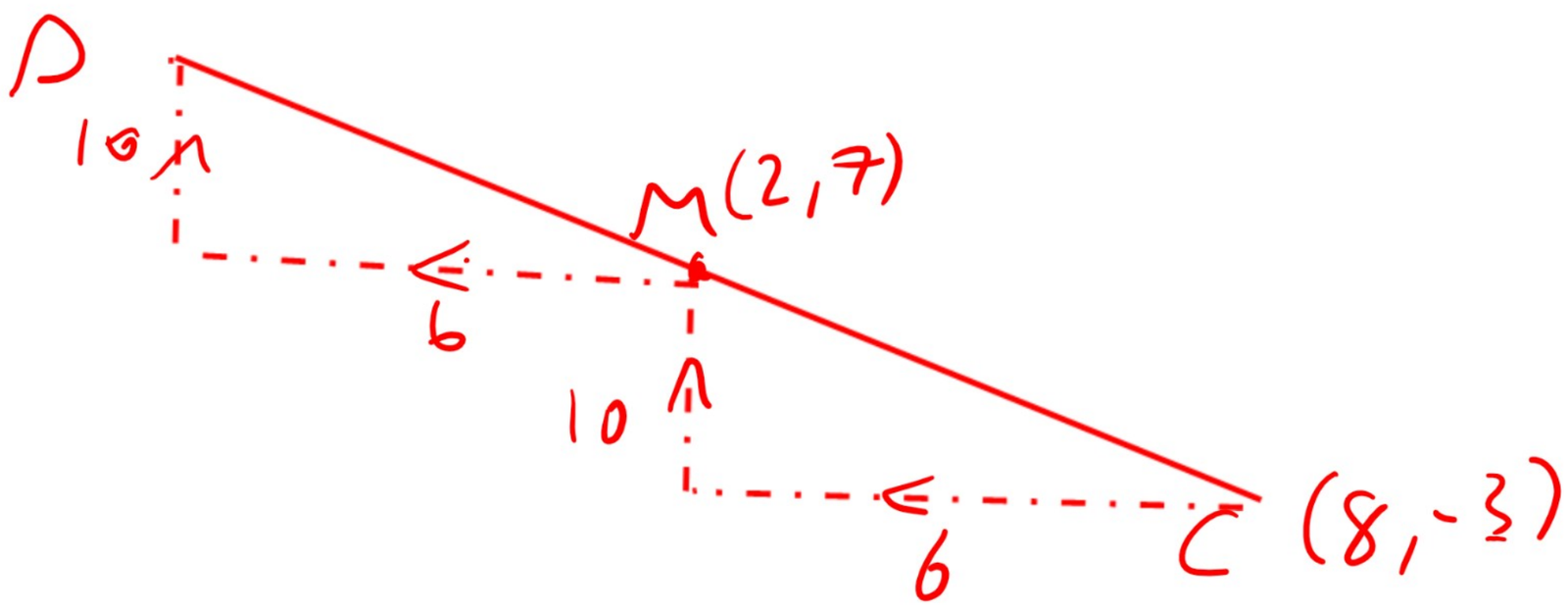
$= \sqrt{288}$

$= 16.970\ldots$

Answer: 17.0

(3 marks)

Q5. a) A line segment has end-points C and D and mid-point M, where C = (8, -3) and M = (2, 7). Work out the co-ordinates of point D.



D = (-4, 17)

Answer: (-4, 17)

(2 marks)

b) Work out the length of DM correct to 1 decimal place.

$$\text{Length} = \sqrt{10^2 + 6^2}$$

$$= \sqrt{176}$$

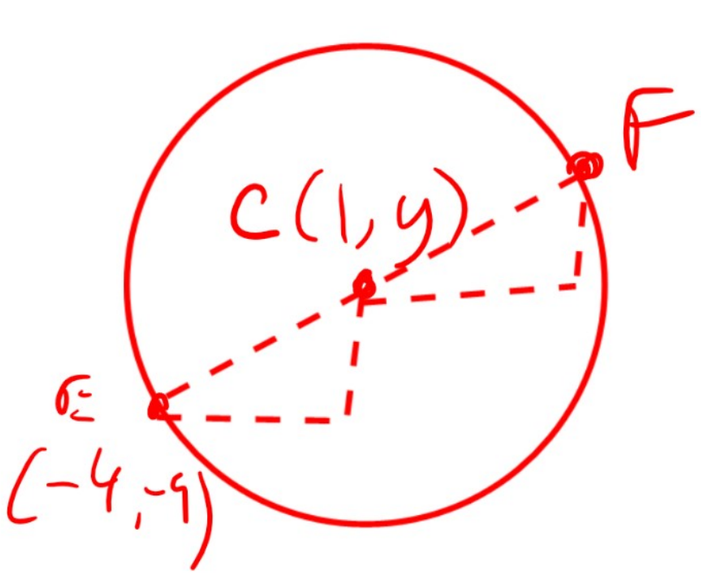
$$= 11.66...$$

Answer: 11.7

(2 marks)

Q6. A circle has diameter EF where E = (-4, -9). The centre of the circle, C, has x co-ordinate 1.

(a) Given that the gradient of the line EC is 2, find the co-ordinates of the point F.

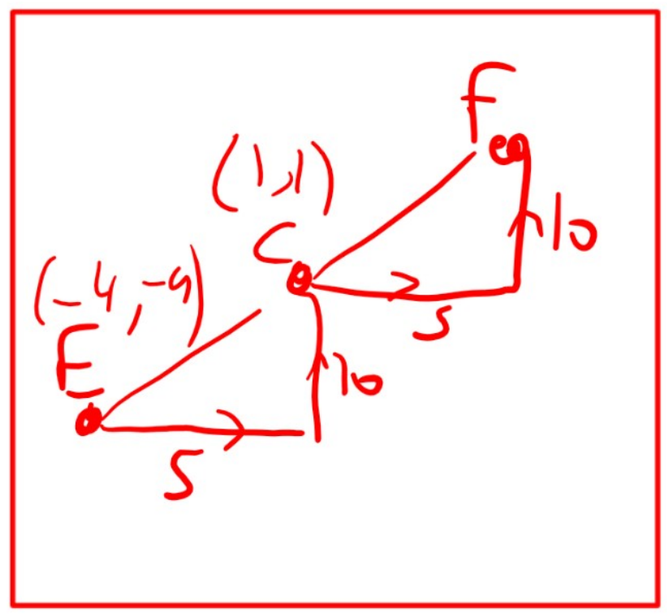


using gradient:

$$\frac{y - -9}{1 - -4} = 2$$

$$\Rightarrow \frac{y+9}{5} = 2$$

$$\Rightarrow y = 1$$



Answer: (11, 16)

(2 marks)

(b) Find the radius of the circle correct to 1 decimal place.

$$\text{radius} = \sqrt{5^2 + 10^2}$$

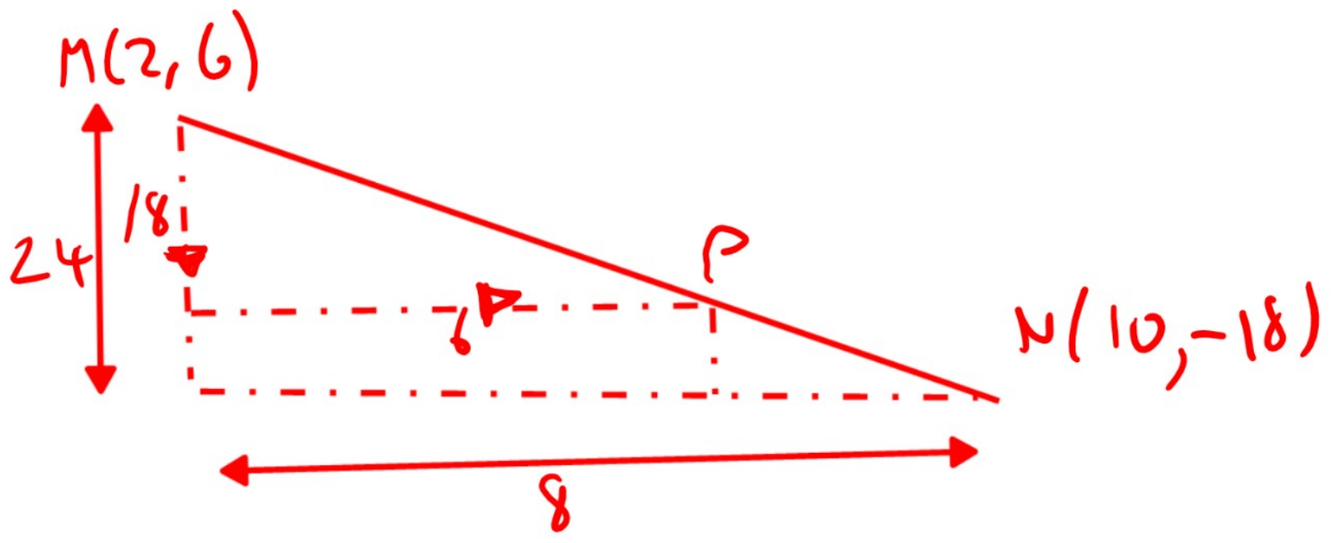
$$= \sqrt{125}$$

$$= 11.18\ldots$$

Answer: 11.2

(3 marks)

Q7. Let MN be a line segment such that M = (2, 6) and N = (10, -18).
Find the coordinates of the point P such that MP : PN is 3 : 1.

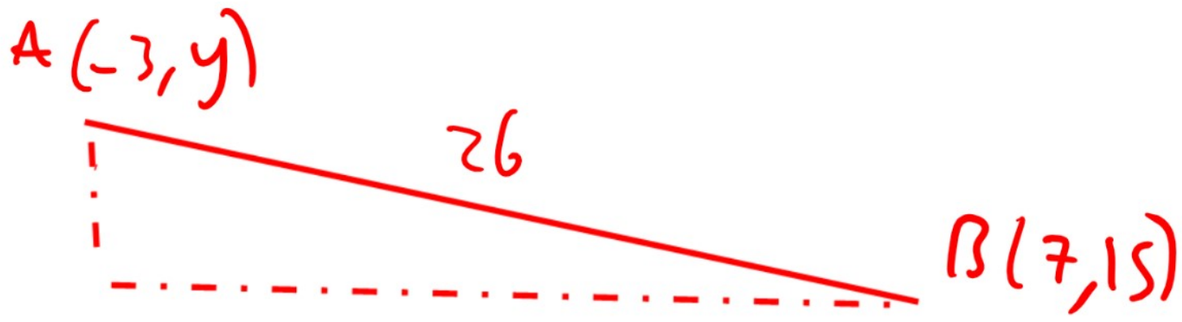


- 24 in the ratio 3:1 is 18, 6
- 8 in the ratio 3:1 is 6, 2
- P = (2+6, 6-18)

Answer: (8, -12)

(3 marks)

Q8. A line segment AB has length 26 units. The co-ordinates of point A is of the form (-3, y) and the co-ordinates of B are given by (7, 15). Given that A is above the x-axis, work out the value of y.



- $\sqrt{(7--3)^2+(15-y)^2} = 26$

$\sqrt{10^2+(15-y)^2} = 26$

$100+(15-y)^2 = 676$

$(15-y)^2 = 576$

$15-y = \pm\sqrt{576}$

$15-y = \pm 24$

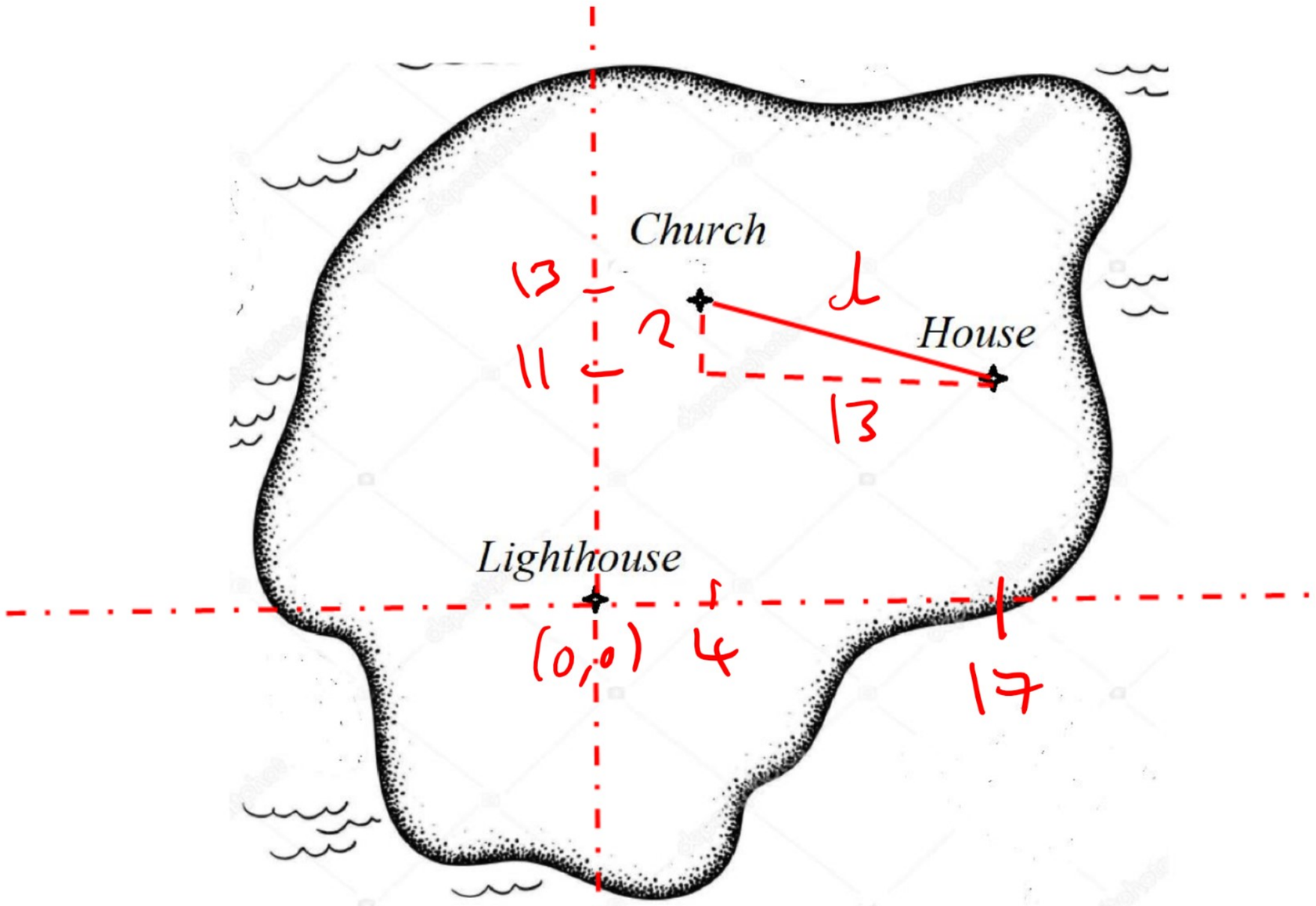
$y = -9, 39$ and only 39 makes A above the x-axis.

Answer: (-3, 39)

(4 marks)

Q9. On the map of an island, the lighthouse has co-ordinates (0,0). The church is 13 miles due North and 4 miles due East of the lighthouse. The house is 11 miles due North and 17 miles due East of the lighthouse.

Find the distance of the church to the house to the nearest mile.



$d = \sqrt{2^2 + 13^2}$

$= \sqrt{173}$

$= 13.15...$

Answer: 13 miles

(4 marks)