Coordinates and Midpoints

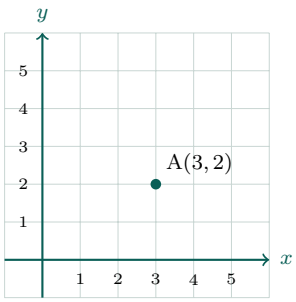
GCSE Mathematics • **Foundation Tier** • Grades 1–3 • Non-calculator

WORKED SOLUTIONS

Name: worked example Class: _____ Total: 49 / 49

Show all your working. Marks are given for correct method as well as the final answer.

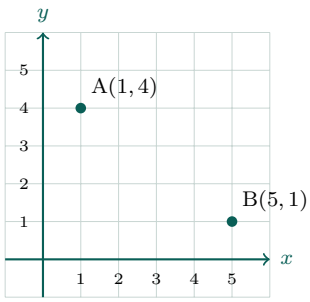
1. Write down the coordinates of point A. **[1 mark]**



along 3, up 2
x first, always

Answer: (3, 2)

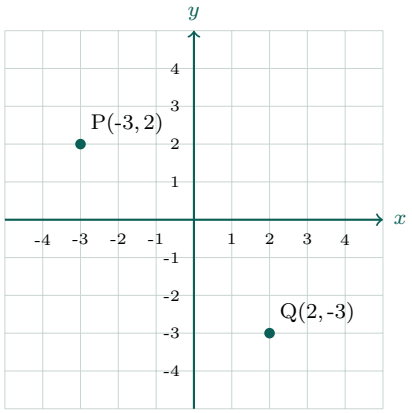
2. Write down the coordinates of points A and B. **[2 marks]**



A: along 1, up 4
B: along 5, up 1

Answer: A(1, 4), B(5, 1)

3. Write down the coordinates of the points shown. **[2 marks]**



P is LEFT of the y-axis, so x is negative
Q is BELOW the x-axis, so y is negative
(-3, 2) and (2, -3) are different points

Answer: P(-3, 2), Q(2, -3)

4. Write down the coordinates of the point where the two axes meet. **[1 mark]**

the origin

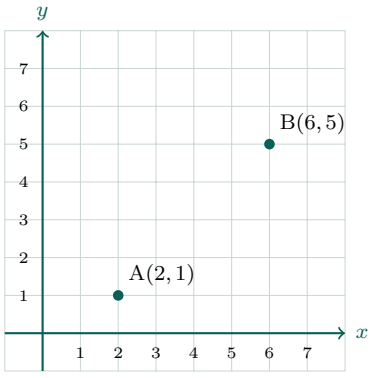
Answer: (0, 0)

5. A point has coordinates $(0, 4)$. Write down which axis it lies on. **[1 mark]**

x = 0 means no movement along
so it sits on the vertical axis

Answer: the y-axis

6. Work out the midpoint of $A(2, 1)$ and $B(6, 5)$. **[2 marks]**



average the x: (2 + 6) ÷ 2 = 4
average the y: (1 + 5) ÷ 2 = 3

Answer: (4, 3)

7. Work out the midpoint of $(1, 3)$ and $(4, 8)$. **[2 marks]**

$(1 + 4) \div 2 = 2.5$
$(3 + 8) \div 2 = 5.5$
a midpoint can be a decimal

Answer: (2.5, 5.5)

8. Work out the midpoint of $(-4, 2)$ and $(2, -6)$. **[3 marks]**

$(-4 + 2) \div 2 = -1$
$(2 + -6) \div 2 = -2$

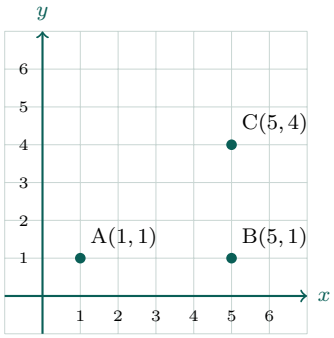
Answer: (-1, -2)

9. $M(5, 4)$ is the midpoint of $A(1, 2)$ and B. Work out B. **[3 marks]**

from A to M: along 4, up 2
do the SAME again to reach B
M is halfway, so the second half matches
$5 + 4 = 9$, $4 + 2 = 6$

Answer: (9, 6)

10. $A(1, 1)$, $B(5, 1)$ and $C(5, 4)$ are three corners of a rectangle. Write down the fourth corner. **[2 marks]**



opposite sides are equal and parallel
D has A's x and C's y

Answer: (1, 4)

11. Work out the length of the line from $(2, 3)$ to $(9, 3)$. **[2 marks]**

same y, so it is horizontal
$9 - 2 = 7$

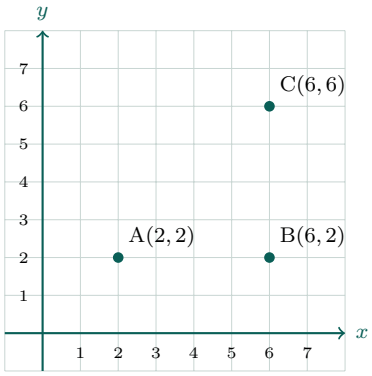
Answer: 7

12. Work out the length of the line from $(4, -2)$ to $(4, 6)$. **[2 marks]**

same x, so it is vertical
$6 - (-2) = 8$
subtracting a negative adds

Answer: 8

13. A square has corners $(2, 2)$, $(6, 2)$ and $(6, 6)$.



(a) Write down the fourth corner. **[1 mark]**

(2, 6)

(b) Work out the area of the square. **[2 marks]**

side = 6 − 2 = 4

area = 4 × 4 = 16

Answer: (2, 6) ; 16 square units

14. Write down the coordinates of the point halfway along the line from $(0, 0)$ to $(10, 4)$. **[2 marks]**

halve both coordinates

Answer: (5, 2)

15. A point P is reflected in the y-axis. P is at $(3, 5)$. Write down the image. **[2 marks]**

reflecting in the y-axis flips the SIGN of x
y stays where it is

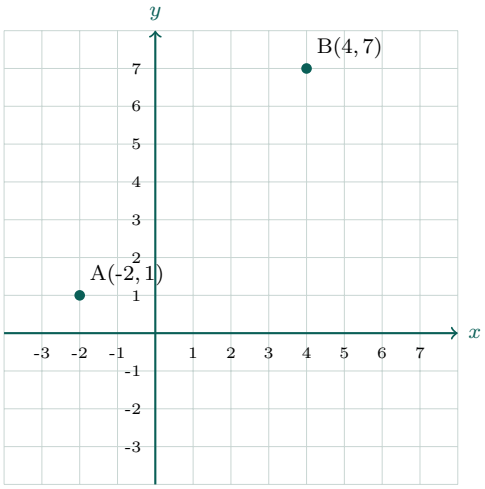
Answer: (−3, 5)

16. Points $(1, 2)$, $(2, 4)$ and $(3, 6)$ lie on a straight line. Write down the next point. **[2 marks]**

x goes up 1, y goes up 2 each time

Answer: (4, 8)

17. A line joins $(-2, 1)$ and $(4, 7)$.



(a) Work out the midpoint. **[2 marks]**

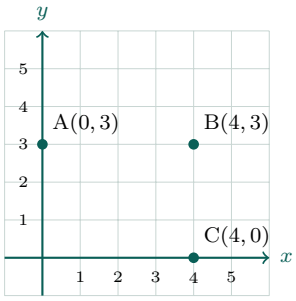
$(-2 + 4) \div 2 = 1$
$(1 + 7) \div 2 = 4$
midpoint $(1, 4)$

(b) Work out how far it goes across and how far up. **[2 marks]**

across: $4 - (-2) = 6$
up: $7 - 1 = 6$

Answer: (1, 4) ; across 6, up 6

18. $A(0, 3)$, $B(4, 3)$ and $C(4, 0)$ are corners of a triangle.



(a) Work out the length AB. **[1 mark]**

same y, so $4 - 0 = 4$

(b) Work out the area of the triangle. **[3 marks]**

$BC = 3 - 0 = 3$
right angle at B
$\frac{1}{2} \times 4 \times 3 = 6$

Answer: AB = 4 ; area 6 square units

19. The midpoint of PQ is $(3, -1)$. P is $(-1, 4)$.

(a) Work out the coordinates of Q. **[3 marks]**

P to M: along 4, down 5

same again: 3 + 4 = 7, −1 − 5 = −6

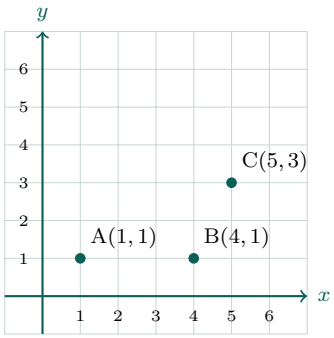
Q(7, −6)

(b) Work out how far Q is to the right of P. **[2 marks]**

7 − (−1) = 8

Answer: (7, −6) ; 8 to the right

20. Three vertices of a parallelogram are $(1, 1)$, $(4, 1)$ and $(5, 3)$.



(a) Write down the fourth vertex. **[2 marks]**

B to C: along 1, up 2

do the same from A: (1 + 1, 1 + 2)

D(2, 3)

(b) Explain how you know your answer is right. **[2 marks]**

AD is parallel and equal to BC

opposite sides of a parallelogram match

Answer: (2, 3) ; AD is equal and parallel to BC

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