

## Midpoint and distance between two points

### Starter

- (Review of last lesson)** A school hall seats a maximum audience of 200 people for performances. Tickets for the Christmas concert cost £3 for adults and £2 for concessions. The school needs to raise more than £450. It is decided that the number of £3 tickets must not be greater than twice the number of £2 tickets.
  - Using  $a$  for the number of adult tickets and  $c$  for the number of concessions tickets, form three inequalities.
  - By letting  $c$  be the horizontal axis and  $a$  be the vertical axis, draw the inequalities on a graph and leave unshaded the required area.
  - Hence find the number of adult and number of concession tickets sold to obtain the maximum income.
- (Review of GCSE material)** Consider the points  $A(5, -8)$  and  $B(2, -2)$ .
  - Find the length of the line segment  $AB$ , giving your answer as a simplified surd.
  - Calculate the coordinates of the midpoint of the line segment  $AB$ .

### Notes

If  $(x_1, y_1)$  and  $(x_2, y_2)$  are two points then:

Distance between the two points:  $\text{Distance} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Midpoint between the two points:  $\text{Midpoint} = \left( \frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2} \right)$

**E.g. 1** What kind of triangle formed by the points  $(-3, -2)$ ,  $(2, -7)$  and  $(-2, 5)$ ?

**E.g. 2** Find the length of the line segment joining the points  $(a + 4b, a - b)$  and  $(a - 3b, a)$

**E.g. 3** The points  $A(-2, 1)$  and  $B(6, 5)$  are the opposite ends of the diameter of a circle. Find the coordinates of its centre.

**E.g. 4** The line segment  $AB$  has  $M$  as its midpoint. Given that the coordinates of  $A$  and  $M$  are  $(7, -3)$  and  $(-2, 6)$  respectively, find the coordinates of  $B$ .

**Video:** [Mid-point of a line segment](#)  
**Video:** [Distance between two points](#)

[Solutions to Starter and E.g.s](#)

### Exercise

p90 6A Qu 1i, 2i, 3-7, (8-9 red)

### Summary

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