

Student Name

Mathematics Stage 5 Core

LINEAR RELATIONSHIPS A

Book 2 Find the distance between 2 points
located on the Cartesian Plane

Version: 260207

Report mistakes & suggest improvements:
<https://MrDingMaths.com>

CONTENTS

Overview	2
Distance	3

OVERVIEW

SYLLABUS CONTENT

MA4-LIN-C-01 determines the midpoint, gradient and length of an interval, and graphs linear relationships, with and without digital tools

Find the distance between 2 points located on the Cartesian plane

- Use the interval between 2 points as the hypotenuse of a right-angled triangle on the Cartesian plane and apply Pythagoras' theorem to determine the length of the interval joining the 2 points
- Use graphing applications to find the distance between 2 points on the Cartesian plane

REVIEW OF PRIOR KNOWLEDGE

1 Calculate the following:

a $8^2 + 4^2$

b $5^2 + 7^2$

c $6^2 + 3^2$

d $2^2 + 8^2$

e $4^2 + 10^2$

2 Calculate these square roots. Round your answer to 2 d.p.

a $\sqrt{43}$

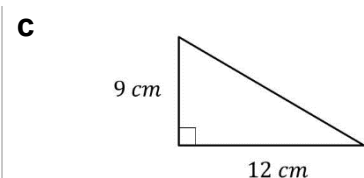
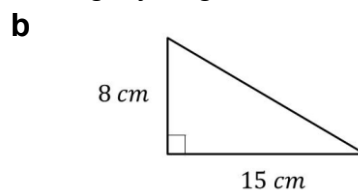
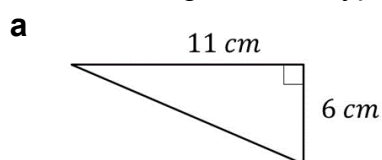
b $\sqrt{75}$

c $\sqrt{66}$

d $\sqrt{59}$

e $\sqrt{28}$

3 Find the length of the hypotenuse using Pythagoras' Theorem



DISTANCE

Distance: <https://www.geogebra.org/m/t94gke48>

- Pythagoras' theorem calculates the distance between two points.

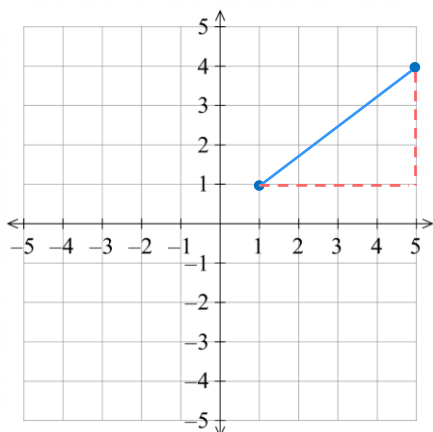
Distance Formula	
$d^2 = \text{rise}^2 + \text{run}^2$ $d = \sqrt{\text{rise}^2 + \text{run}^2}$	

Example Calculate length of an interval.

(1,4) and (8,6) Rise: 2 Run: 7 $d^2 = 2^2 + 7^2$ $d^2 = 53$ $d = \sqrt{53} \approx 7.28$	Why are we able to apply Pythagoras Theorem? <i>A line interval is the of a-..... triangle.</i> What happened between the lines $d^2 = 53$ and $d = \sqrt{53}$? <i>We both sides to isolate d.</i>
(-5,8) and (4,-2) Rise: -10 Run: 9 $d^2 = (-10)^2 + 9^2$ $d^2 = 181$ $d = \sqrt{181} \approx 13.45$	Why is the rise -10 in this example? <i>The line is sloping from left to right.</i> Does a negative rise affect the answer? <i>....., because we square the rise, so rise^2 is always</i>

Calculate length of these intervals. Round your answer to 2 decimal places.

a (1,1) and (5,4)



Rise

Run

$$d^2 = \dots + \dots$$

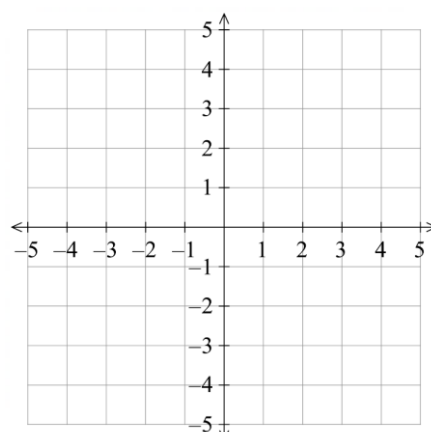
$$= \dots$$

$$d = \dots$$

$$= \dots$$

5

b (0,0) and (−3,−4)



Rise

Run

$$d^2 = \dots + \dots$$

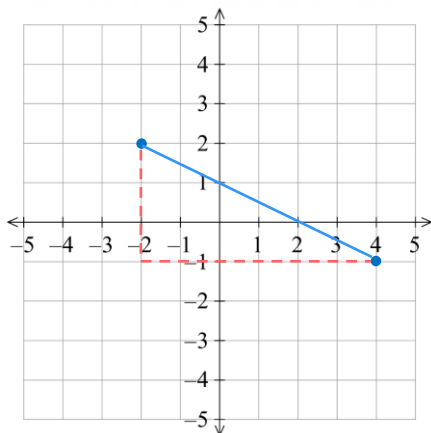
$$= \dots$$

$$d = \dots$$

$$= \dots$$

5

c (−2,2) and (4,−1)



Rise

Run

$$d^2 = \dots + \dots$$

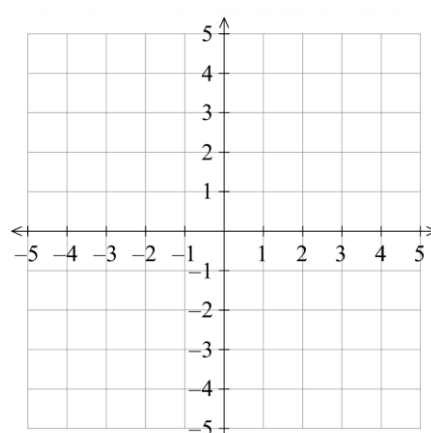
$$= \dots$$

$$d = \dots$$

$$= \dots$$

6.71

d (−4,−3) and (2,1)



Rise

Run

$$d^2 = \dots + \dots$$

$$= \dots$$

$$d = \dots$$

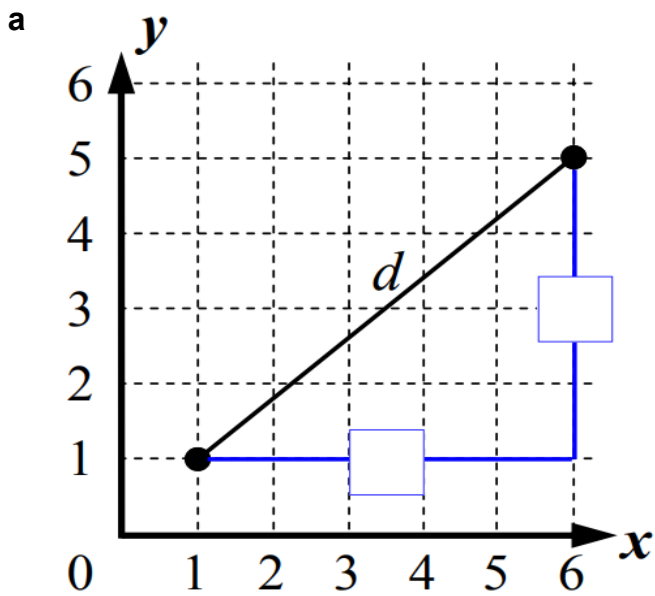
$$= \dots$$

7.21

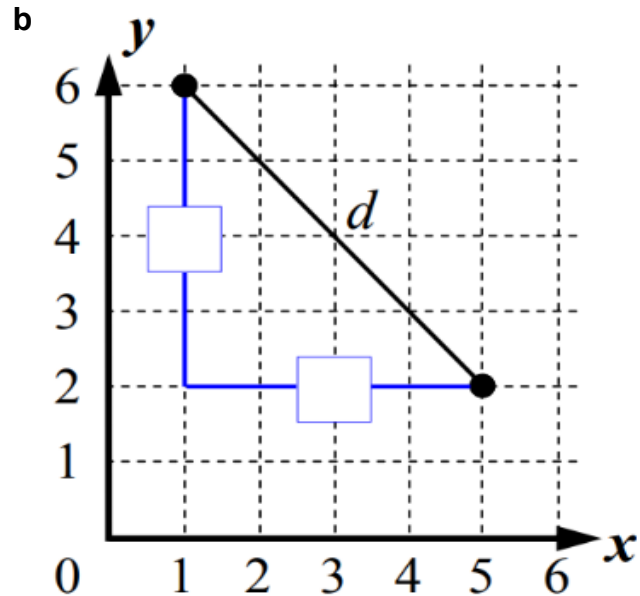
Key ideas

1. Calculate the length of a line by forming a-..... triangle using the rise and run, then applying Theorem.

1 Calculate the distance of these intervals. Check your answer by measuring with a ruler.

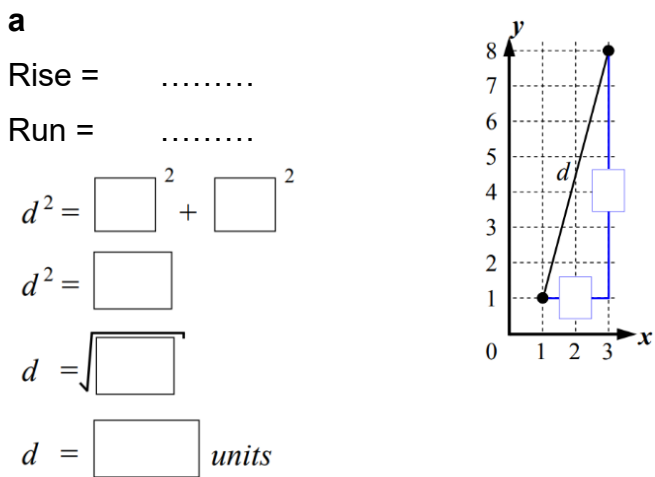


Rise =
Run =
 $d^2 = \square^2 + \square^2$
 $d^2 = \square$
 $d = \sqrt{\square}$
 $d = \square$ units

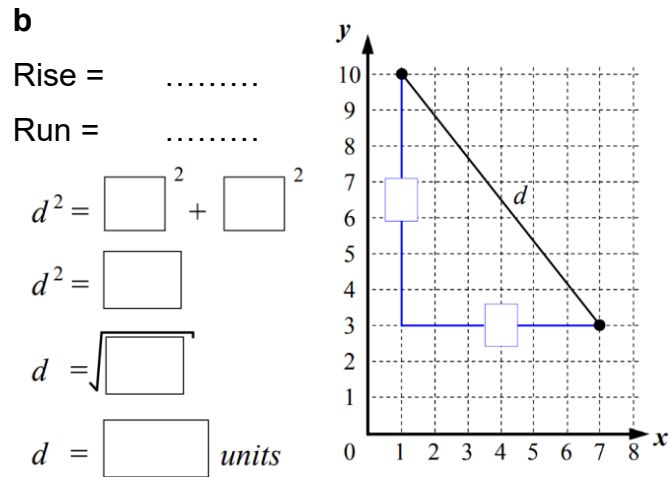


Rise =
Run =
 $d^2 = \square^2 + \square^2$
 $d^2 = \square$
 $d = \sqrt{\square}$
 $d = \square$ units

2 Calculate the distance of these intervals. You won't be able to use a ruler.



Rise =
Run =
 $d^2 = \square^2 + \square^2$
 $d^2 = \square$
 $d = \sqrt{\square}$
 $d = \square$ units



Rise =
Run =
 $d^2 = \square^2 + \square^2$
 $d^2 = \square$
 $d = \sqrt{\square}$
 $d = \square$ units

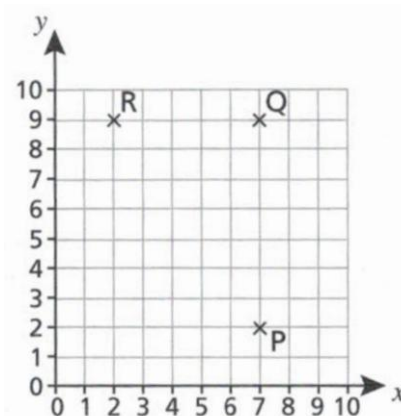
3

- Explain why $PQ = 7$ units
- Explain why $QR = 5$ units
- Use Pythagoras' theorem to show that $PR = 8.6$ units to 1 decimal place.

.....

.....

.....



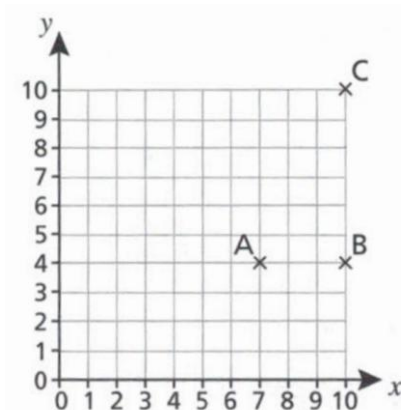
4

- Write the length of AB
- Write the length of BC
- Use Pythagoras' theorem to work out the length of AC . Give your answer to 1 decimal place.

.....

.....

.....



5 Calculate the distance of these intervals.

- $(4, 5)$ and $(1, -3)$

Rise =

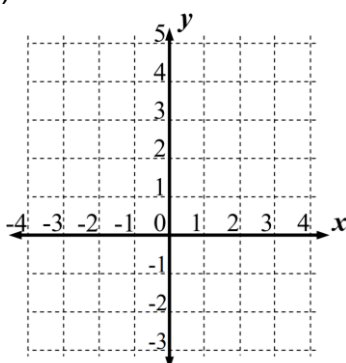
Run =

$$d^2 = \boxed{}^2 + \boxed{}^2$$

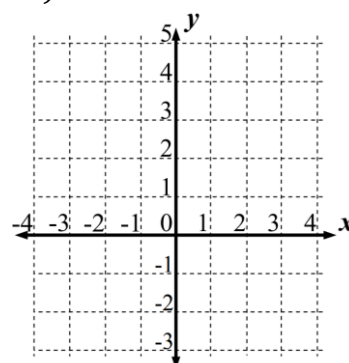
$$d^2 = \boxed{}$$

$$d = \sqrt{\boxed{}}$$

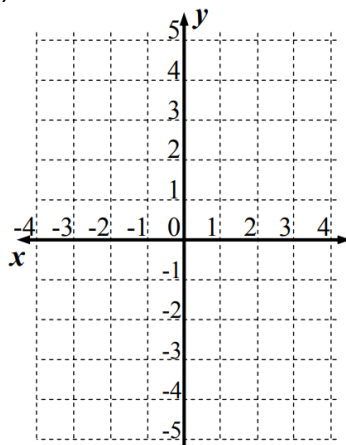
$$d = \boxed{} \text{ units}$$



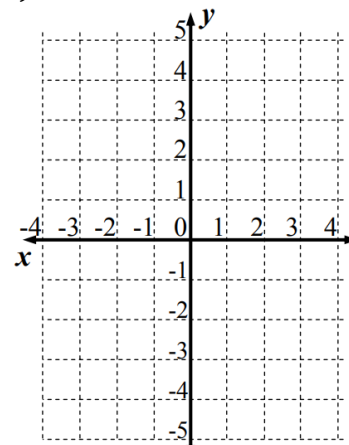
- $(-3, 4)$ and $(-1, -2)$



- $(-4, 4)$ and $(2, 5)$

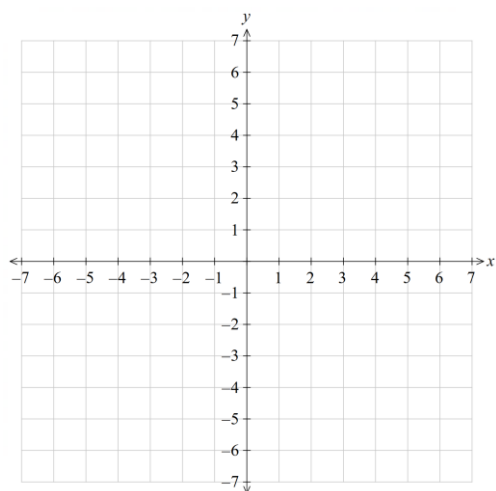


- $(-4, 2)$ and $(1, -5)$

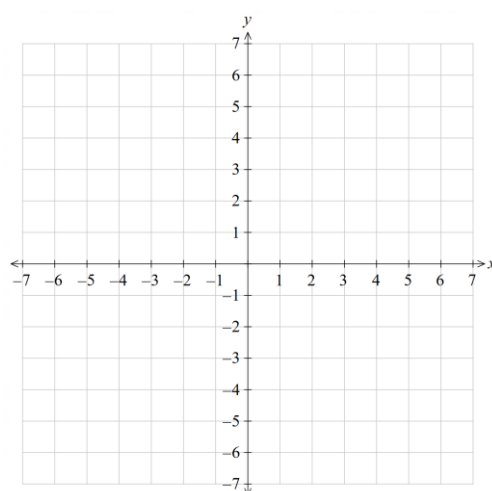


6 Plot these intervals on the Cartesian plane and calculate the distance.

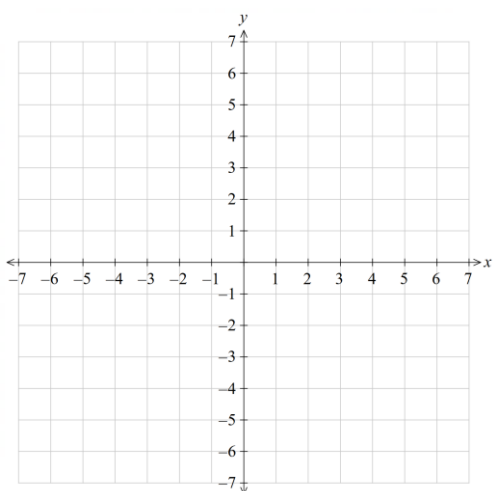
a $(0, 1)$ and $(4, 7)$



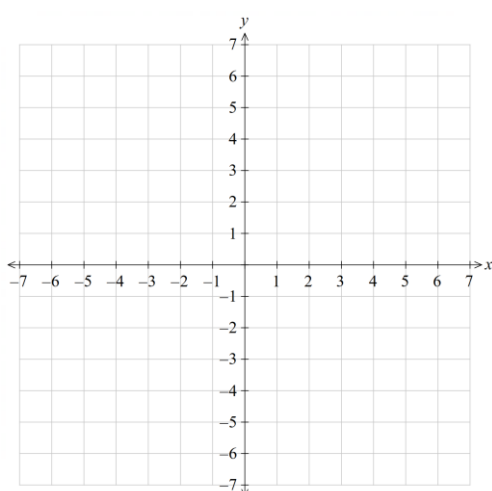
b $(-2, -1)$ and $(4, -2)$



c $(-5, 3)$ and $(6, 2)$

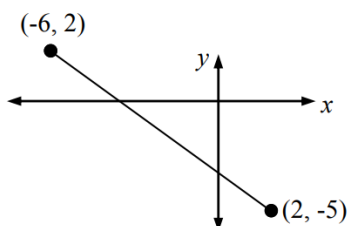


d $(-7, 0)$ and $(5, -4)$

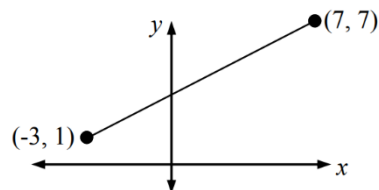


7 Calculate the distance between these two points.

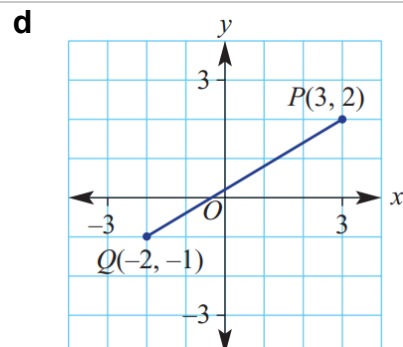
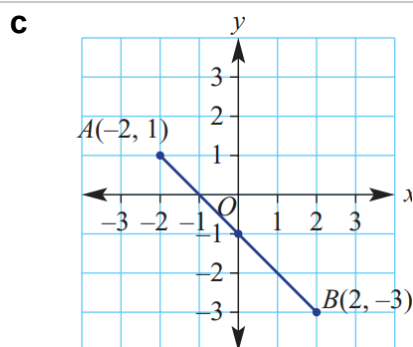
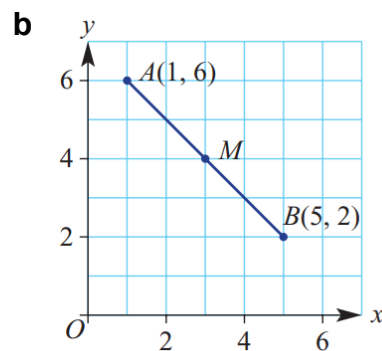
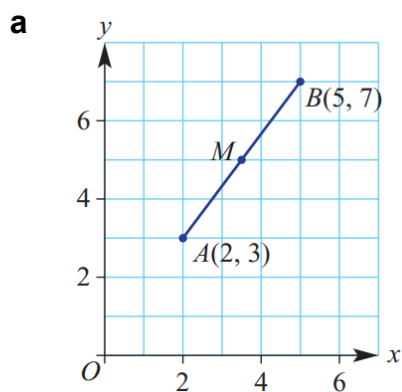
a



b



8 Find the midpoint, gradient, and length of these line segments.



9 Find the length between these intervals without drawing it.

a (0,0) and (6,8)

h (1,1) and (8, -10)

b (0,0) and (-6,8)

i (1,1) and (-1, -1)

c (0,0) and (-6, -8)

j (15, 1) and (8, 12)

d (0,0) and (-6, -8)

k (15, 23) and (8, 12)

e (1,1) and (7,9)

l (1,1) and (-16,20)

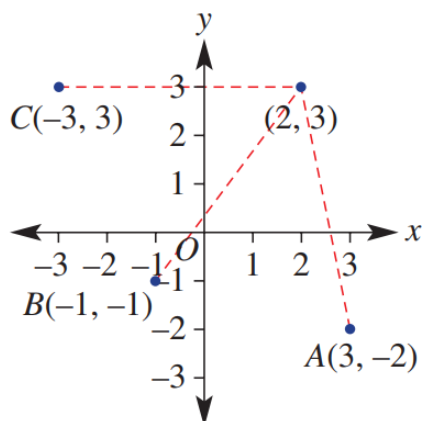
f (1,1) and (8,10)

m (1,1) and (-17,19)

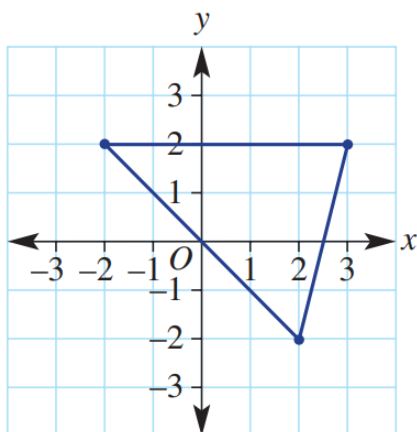
g (1,1) and (-8,10)

n (-8,10) and (-17,19)

- 10 Which of the points A , B , or C is closest to the point $(2,3)$?



- 11 A block of land is shown on this map. Each unit distance represents 100 metres in real life. Calculate the perimeter of the block.



- 12 Find the value of a when the distance between:

a $(1, a)$ and $(3, 5)$ is $\sqrt{8}$

b $(a, -1)$ and $(4, -3)$ is $\sqrt{29}$

13 NAPLAN A

Calculate the values of p if the distance between $(p, 3)$ and $(1, p)$ are exactly 10 units apart.