



Year 10 MATHEMATICS 5.1/5.2 2023

TASK 2 – Half Yearly Examination

General Instructions

- Reading time – 5 minutes
- Working time – 90 minutes
- Show all necessary working / units
- Board approved calculators are allowed
- Exam guidelines
 - ✓ Use black pen for your working
 - ✓ Use a pencil and ruler for diagrams
 - ✓ Marks may be lost for poorly organised written work.

Total Marks – 80

Section 1 5.1 – 40 marks

Suggested time: 40 mins

Section 2 5.2 – 40 marks

Suggested time: 50 mins

Examiner's use only		D.Hua, V.Chan, B.Su, B. Vincent, J. Barter		
Question	Indices and Algebra	Equations and Formulas	Linear and non-linear relations	Total
Section 1 (5.1)				/40
1-4,11-14	/11			
5-7,15		/10		
8-10,16-19			/19	
Section 2 (5.2)				/40
1-3,13-15	/12			
7-8,11-12		/12		
4-6,9-10,16-18			/16	
				/80

Section 1 – 5.1 (40 marks)

Attempt Questions 1 to 19

Allow approximately 40 minutes for this section

Multiple Choice Questions 1-10

1. Which expression cannot be simplified?

☒ A. $7x + 5y$

B. $7x \times 5y$

C. $3x - 9x$

D. $3x \div 9x$

2. If $x = 3$ and $y = 1$, the value of $5x - y$ is equal to:

A. 10

B. 7

C. 52

☒ D. 14

3. $2^3 \times 2^5$ simplifies to:

A. 2^2

☒ B. 2^8

C. 2^{15}

D. 4^8

4. $7m^0$ simplifies to:

☒ A. 7

B. $7m$

C. 1

D. m

5. If $y - 14 = 8$, y is?

A. -6

B. 6

☒ C. 22

D. -22

6. $S = 2\pi r(r + h)$ is the formula for the surface area of a cylinder with radius r and height h . What is the surface area of a cylinder with radius 5.5cm and height 12cm ?

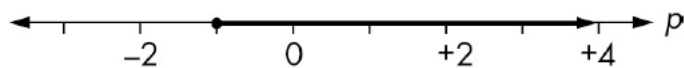
☒ A. 604.76cm^2

B. 603.76cm^2

C. 186.23cm^2

D. 187.23cm^2

7. What is the inequality shown on the number line below?



A. $p > -1$

☒ B. $p \geq -1$

C. $p < -1$

D. $p \leq -1$

8. A coordinate that does NOT lie on the line $y = -3x$ is:

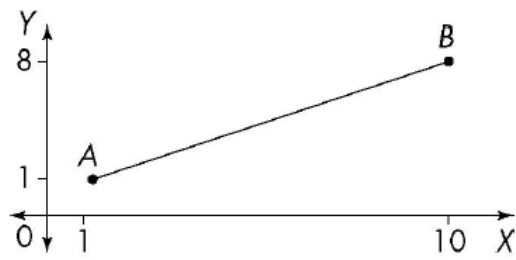
A. $(2, -6)$

B. $(1, -3)$

C. $(0, 0)$

☒ D. $(-9, 3)$

9. The midpoint of the line interval AB is:



- ☒ A. (5.5, 4.5) B. (4.5, 3.5)
- C. (4.5, 5.5) D. (5.5, 3.5)
10. Which of the following equations would produce a parabolic graph?
- A. $y = 3x^3$
- ☒ B. $y = 10x^2$
- C. $y = 5x - 2$
- D. $y = 2^x$

Short Answer Questions 11-19

Answer the questions in the spaces provided. Your responses should include relevant mathematical reasoning and/or calculations.

Marks **CANNOT** be awarded for poorly organised written work.

11. Find the simplest form of the expression $2m - 3n - 5m + n$. (1 mark)

$$-3m - 2n$$

12. Expand and simplify $6(2x - 1) - 3x$ (2 marks)

$$\begin{aligned} &= 12x - 6 - 3x \\ &= 9x - 6 \end{aligned}$$

(1) expansion
(1) simplifying

13. Write the following numbers in scientific notation:

- a. 901 200 (1 mark)

$$9.012 \times 10^5$$

- b. 0.00304 (1 mark)

$$3.04 \times 10^{-3}$$

14. Apply the index laws to simplify the following expressions

- a. $2p^2 \times 5p^4$ (1 mark)

$$10p^6$$

- b. $10d^6 \div 30d^2$ (1 mark)

$$\frac{d^4}{3}$$

15. Solve for the pronumerals in the following equations:

a. $w + 2 = 10$

(1 mark)

$$w = 8$$

b. $7x - 3 = -24$

(2 marks)

$$+3 \quad +3$$

$$7x = -21 \quad \checkmark$$

$$x = -3 \quad \checkmark$$

c. $\frac{x}{3} - 1 = 11$

(2 marks)

$$+1 \quad +1$$

$$\frac{x}{3} = 12 \quad \checkmark$$

$$x = 36 \quad \checkmark$$

d. $4(a - 2) = 12$

(2 marks)

$$4a - 8 = 12 \quad \checkmark$$

$$4a = 20$$

$$a = 5 \quad \checkmark$$

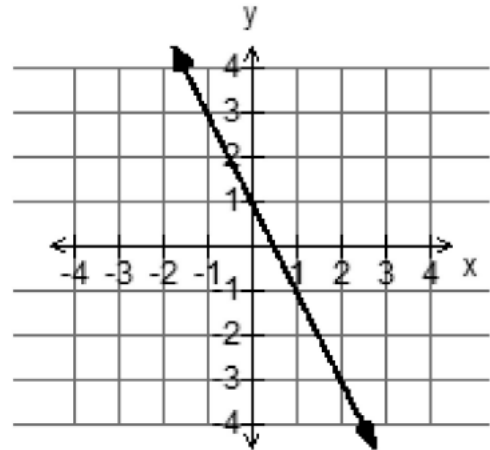
16. From the linear relationship as shown, find:

- a. the y-intercept (c) (1 mark)

$c = 1$

- b. the gradient (m) (2 marks)

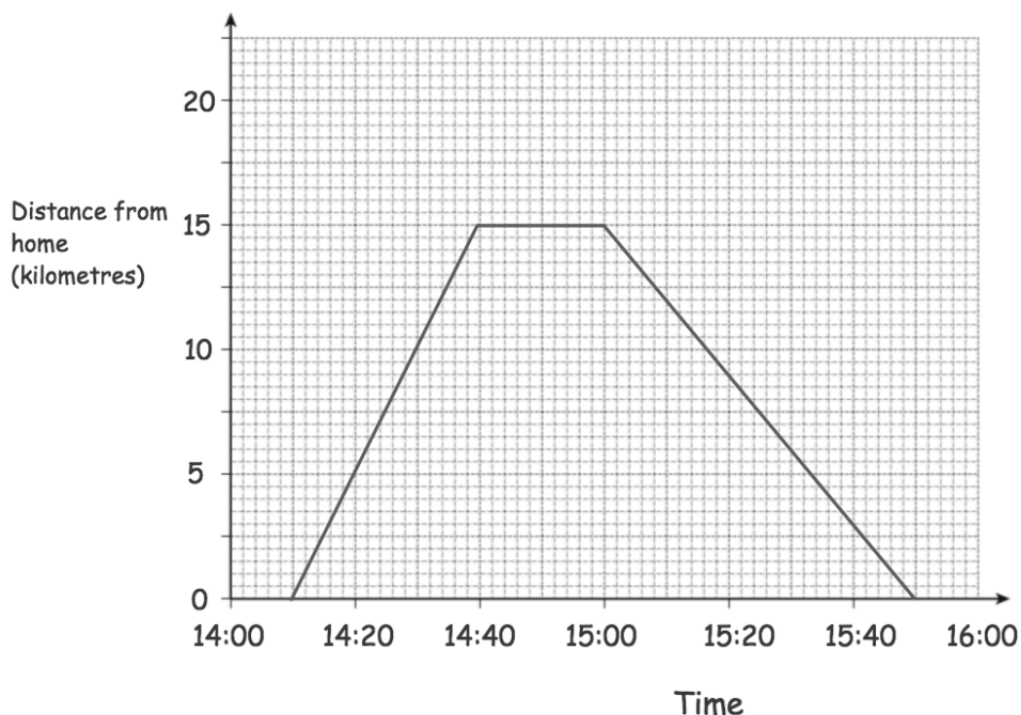
$m = \frac{\text{rise}}{\text{run}} = \frac{-2}{1} = -2$ ✓



- c. the equation of the straight line using $y = mx + c$ (1 mark)

$y = -2x + 1$

17. Joseph travelled from his home to his friend's house 15km away. Joseph stayed for some time then returns home. The distance-time graph is below.



- a. How far was Joseph from home at 14:30? (1 mark)

10 km

- b. How long did Joseph stay at his friend's house? (1 mark)

20 mins

- c. How far did Joseph travel in total? (1 mark)

30 km

- d. Was Joseph's speed faster getting to his friend's house or going home? (2 marks)
Give a reason for your conclusion.

Going to his friend's house = $\frac{15 \text{ km}}{30 \text{ mins}}$

Coming home = $\frac{15 \text{ km}}{50 \text{ mins}}$

18. Dominic works for a pizza shop and each day earns a base pay of \$64 plus \$4 for each pizza he delivers.

- a. If Dominic delivers 19 pizzas on Tuesday, how much did he earn? (1 mark)

$$64 + 4 \times 19 = \$140$$

- b. How many pizzas does Dominic need to deliver to earn \$236 in a day? (2 marks)

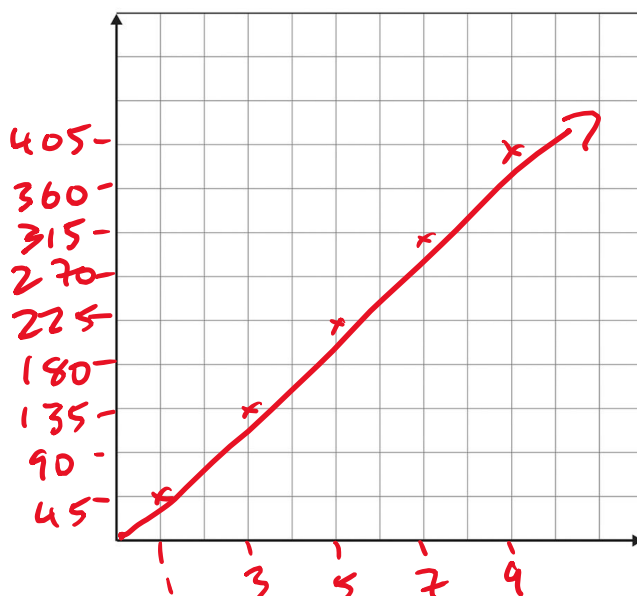
$$\frac{236 - 64}{4} = 43 \text{ pizzas. } \checkmark$$

19. A lawn mowing company earns \$45 for every lawn they mow.

- a. Fill out the table below. (1 mark)

Number of lawns mowed (n)	1	3	5	7	9
Earnings (E)	\$45	135	225	315	405

- b. Label the axes below then plot a graph of the values from part a. (2 marks)



① correct axes

① correct graph

- c. Determine how many lawns must be mowed to earn \$270. (1 mark)

$$6$$

Section 2 – 5.2 (40 marks)

Attempt Questions 1 to 18

Allow approximately 50 minutes for this section

Multiple Choice Questions 1-10

1. The expanded form of $5a(4a + 3)$ is:

A. $20a^2 + 3$

B. $20a + 15$

C. $9a^2 + 8a$

☒ D. $20a^2 + 15a$

2. When simplified, $x^3y^6 \times xy^7$ is:

A. x^3y^{42}

B. x^3y

☒ C. x^4y^{13}

D. x^4y^{14}

3. $(5a^3b^2)^2$ simplifies to:

A. $10a^6b^4$

☒ B. $25a^6b^4$

C. $10a^5b^4$

D. $25a^5b^4$

4. The gradient of a line parallel to $y = 10x + 5$ is:

A. 0.5

B. 2

☒ C. 10

D. 5

5. On which of the following lines does the point $(4, -10)$ lie?

A. $y = 2x + 5$

B. $y = 3x - 2$

C. $y = 5 - 2x$

☒ D. $y = 2 - 3x$

6. The gradient of the line joining the points $(1, 2)$ and $(3, 6)$ is:

A. -2

☒ B. 2

C. 3

D. -3

7. $x \leq 2$ is a solution to the inequality:

A. $x - 2 < 0$

B. $2x + 3 \geq 7$

☒ C. $-4x \geq -8$

D. $x - 10 > 12$

8. When 3 less than 4 lots of a number is doubled, the result is 12. This translates to which equation?

A. $6x - 4 = 12$

☒ B. $2(4x - 3) = 12$

C. $2(3x - 4) = 12$

D. $2x = 12$

9. When the expression $(x + 2)(x - 5)$ is expanded, the result will be:

A. $x^2 - 3x + 10$

☒ B. $x^2 - 3x - 10$

C. $x^2 + 3x - 10$

D. $x^2 + 3x + 10$

10. The graph of $y = -x^2 + 3$ will be:

A. a straight line

B. a concave up parabola

C. an exponential curve

☒ D. a concave down parabola

Short Answer Questions 11-18

Answer the questions in the spaces provided. Your responses should include relevant mathematical reasoning and/or calculations.

Marks **CANNOT** be awarded for poorly organised written work.

11. Solve for x in the following equations.

a. $5x = 2x + 12$

(2 marks)

$$5x - 2x = 12 \quad \checkmark$$

$$3x = 12$$

$$x = 4 \quad \checkmark$$

b. $\frac{x}{3} - 12 = 4$

(2 marks)

$$\frac{x}{3} = 4 + 12 \quad \checkmark$$

$$\frac{x}{3} = 16$$

$$x = 48 \quad \checkmark$$

c. $3(2x + 4) - 4(x + 2) = 6$

(3 marks)

$$6x + 12 - 4x - 8 = 6 \quad \checkmark$$

$$2x + 4 = 6 \quad \checkmark$$

$$2x = 2$$

$$x = 1 \quad \checkmark$$

12. Solve the simultaneous equations $4x + 3y = -1$ and $y = 2x - 7$ by using the method of substitution. (3 marks)

$$4x + 3(2x - 7) = -1 \quad \checkmark$$

$$4x + 6x - 21 = -1$$

$$10x - 21 = -1$$

$$10x = 20$$

$$x = 2 \quad \checkmark$$

$$\therefore y = -3 \quad \checkmark$$

13. Use index laws to simplify the following and express the solution with positive indices where required:

a. $3x^2 \times (2x)^3$ (2 marks)

$$24x^5 \quad \text{---} \quad \textcircled{1}$$

$\textcircled{1}$

b. $6p^4q \div 2pq^3$ (2 marks)

$$\frac{3p^3}{q^2} \quad \text{---} \quad \textcircled{1}$$

$$q^2 \quad \text{---} \quad \textcircled{1}$$

14. Simplify $\frac{x}{2} + \frac{x}{3}$ (2 marks)

$$= \frac{3x}{6} + \frac{2x}{6} \quad \checkmark$$

$$= \frac{5x}{6} \quad \checkmark$$

15. An initial investment of \$5 000 grows every year according to the formula $A = 5\,000 (1.01)^n$ where A is the value of the investment after n years. Find the value of the investment after 8 years, giving the answer in scientific notation rounded to 2 significant figures. (3 marks)

$$A = 5000 (1.01)^8 \quad \checkmark$$

$$= 5414.28$$

$$\div 5.4 \times 10^3 \quad \checkmark$$

scientific

sig fig

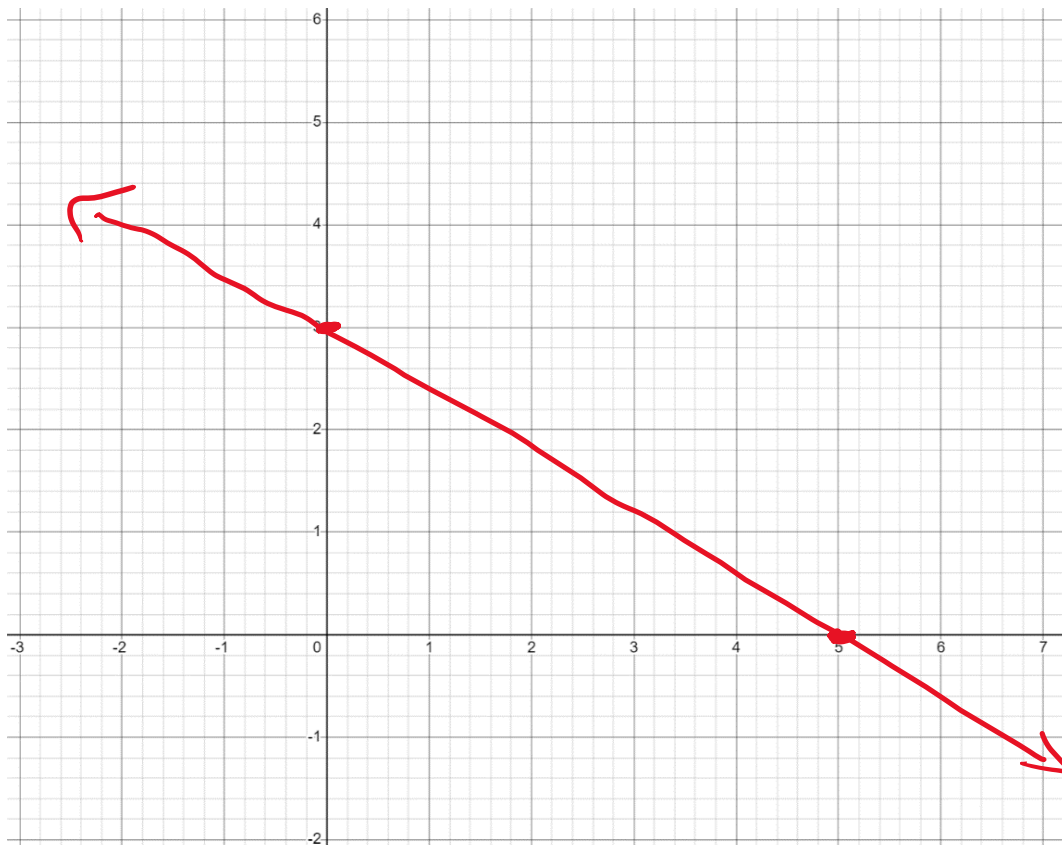
16. For the equation $3x + 5y = 15$:

- a. Calculate the x and y intercepts. (2 marks)

$$\text{let } x=0, y=3 \quad \checkmark$$

$$y=0, x=5 \quad \checkmark$$

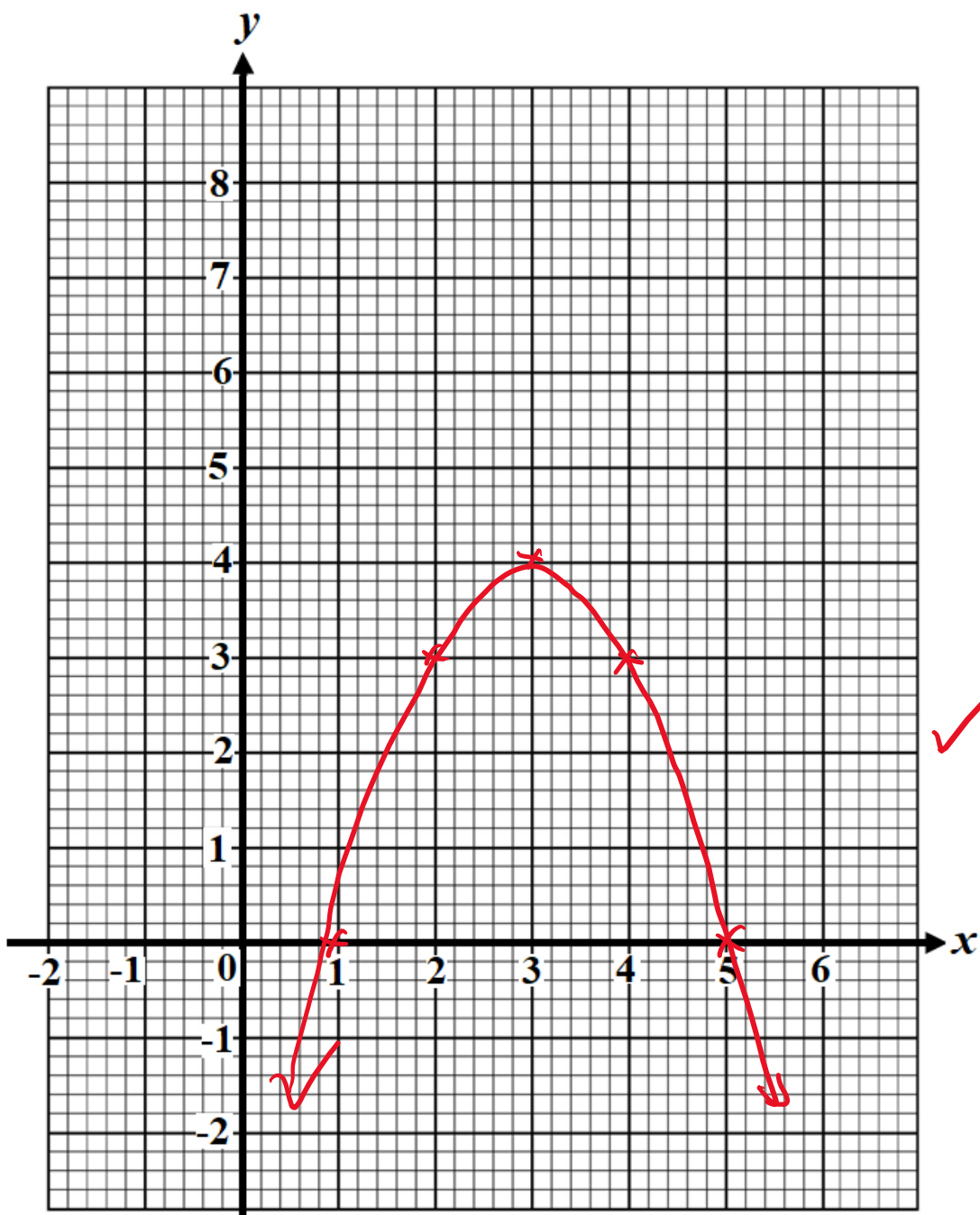
- b. Hence or otherwise, sketch $3x + 5y = 15$. (1 mark)



17. a. Fill in the table for the given equation below and then plot the graph of this equation on number plane below. (2 marks)

$$y = -x^2 + 6x - 5$$

x	1	2	3	4	5
y	0	3	4	3	0



b. From the graph sketched, identify:

- i. The x-intercepts. (1 mark)

$$x = 1, 5$$

- ii. The axis of symmetry. (1 mark)

$$x = 3$$

- iii. The vertex. (1 mark)

$$(3, 4)$$

18. Find the equation of the line that is parallel to $y = 2x + 3$ and passes through the point $(1, 5)$. (3 marks)

$$m = 2 \quad \checkmark$$

$$y - y_1 = m(x - x_1)$$

$$y - 5 = 2(x - 1) \quad \checkmark$$

$$y - 5 = 2x - 2$$

$$y = 2x + 3 \quad \checkmark$$

End of Exam



Norwest Christian School
Mathematics Formulas (Stage 5)

Indices

$$a^m \times a^n = a^{m+n}$$

$$a^m \div a^n = a^{m-n}$$

$$(a^m)^n = a^{m \times n}$$

$$a^{-m} = \frac{1}{a^m}$$

$$a^0 = 1$$

$$a^{\frac{1}{m}} = \sqrt[m]{a}$$

Surds

$$\sqrt{a} \times \sqrt{b} = \sqrt{a \times b}$$

$$\sqrt{a} \div \sqrt{b} = \sqrt{\frac{a}{b}}$$

Equation of straight line

$$y = mx + c$$

$$y - y_1 = m(x - x_1)$$

Right angled triangle

$$a^2 + b^2 = c^2$$

Distance and Midpoint

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

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