

# *High School*

Year  
7

## Mathematics Test – Basic Algebra

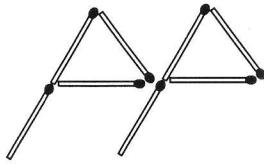
## Non Calculator Test

Name \_\_\_\_\_

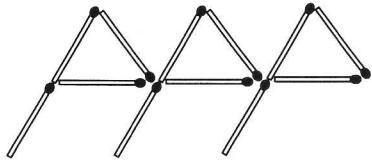
Questions 1 – 3 refer to the diagram below, where matchsticks are used to make a pattern.



1 shape  
4 matches



2 shapes  
8 matches



3 shapes  
12 matches

- 
1. How many matches are needed to produce 4 shapes?

4

12

15

16

---

2. How many matches would be needed to make 7 shapes?

28 matches.

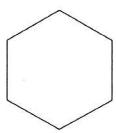
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3. Complete the statement below.

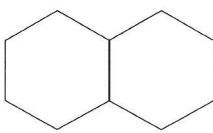
The number of matches = 4 × the number of shapes.

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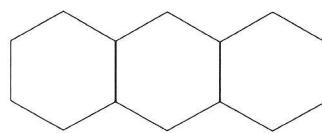
Questions 4 – 6 refer to the diagram below, of repeated patterns of hexagons.



1 hexagon  
6 sides



2 hexagons  
11 sides



3 hexagons  
16 sides

4. How many sides would be needed to make this pattern with 4 hexagons?

21

sides.

5. How many sides would be needed to make this pattern with 8 hexagons?

31 sides

41 sides

42 sides

48 sides

6. Complete the statement below.

$$\text{The number of sides} = \boxed{5} \times \text{the number of hexagons} + \boxed{1}$$

Questions 7 – 9 refer to the pattern of numbers below.

Position in pattern	Number
1	17
2	14
3	11
4	8

7. What number would be at position 4 in the pattern?

8

8. What number would be at position 6 in the pattern?

2

9. Complete the statement below.

$$\text{Number} = \boxed{20} - \boxed{3} \times \text{the position in the pattern.}$$

10.  $m + m + m + m + m + m =$

 $6m$  $m^6$  $\frac{m}{6}$  $m + 6$ 

11.  $p \times p \times p \times r \times r =$

 $5pr$  $3p + 2r$  $p^3r^2$  $32pr$ 

12. Which of the following is **not** equivalent to  $5a$ ?

 $2a + 3a$  $a + a + a + a + a$  $5 + a$  $6a - a$ 

13.  $4m + 7m - m =$

 $11m$  $10m$  $11$  $9m$ 

14. Simplify the expression  $-3x + 11x - 5x$

$3x$

15. Which of the following is **not** equivalent to  $12a^2b$ ?

 $4a \times 3ab$  $7a^2b + 5a^2b$  $a^2 \times 12b$  $(6ab)^2$ 

16.  $3pq \times 5pr =$

 $15p^2qr$  $15pqr^2$  $8p^2qr$  $8pqr^2$ 

17. Simplify  $7m^2n \times 3np$

$21m^2n^2p$

18.

Which of the following is **not** equivalent to  $\frac{x}{3}$ ?

$\frac{3x}{9}$

$\frac{x^2}{3x}$

$x \div 3$

$\frac{x^2}{9x}$

19.

$30p^2q \div 5pq =$

$6pq$

$6p$

$6p^2$

$6q$

20.

Simplify  $\frac{32a^2bc}{4ac}$ .

$8ab$

21.

$-18fg \times -2ef =$

$-36ef^2g$

$36ef^2g$

$-20ef^2g$

$36efg^2$

22.

Simplify  $-8stu \times 4tw$

$-32stuvw$

23.

$3z + 4y + 8z + 9y = ?$

$7zy + 17yz$

$24yz$

$11z + 13y$

$11y + 13z$

24.

$12a - 6b - 9a - 4b = ?$

$3a - 10b$

$3a - 2b$

$3a + 10b$

$7ab$

25.

Simplify  $4mn + 2m^2 - 6m^2 - 7nm$

$-3mn - 4m^2$

26. Which of the following is **not** equivalent to  $-2a + 5a^2$ ?

$12a + 3a^2 - 14a + 2a^2$         $-10a + 10a^2 + 8a - 5a^2$   
  $-3a^2 + 8a - 6a - 2a^2$         $7a^2 + 3a - 2a^2 - 5a$

---

27. If  $r = 4$ , then  $2r^2 = ?$

64                          32                          16                          576  
                 

---

28. When  $a = 12$ ,  $b = -3$  and  $c = 2$ ; the value of  $\frac{ac}{b} = ?$

-8                          8                           $4\frac{2}{3}$                            $-4\frac{2}{3}$   
                 

---

29. When  $j = 5$ ,  $k = -2$  and  $m = 6$ , calculate the value of  $j^2 + kl$ .

13
----

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30. Find the value of  $2x^2 + \frac{y}{z}$  when  $x = -2$ ,  $y = -18$  and  $z = -3$ .

14
----

---

31. Using the rule  $v = u + at$ , find the value of  $v$ , when  $u = 25$ ,  $a = 10$  and  $t = 4$ .

65
----

---

32. Complete the values in the table using the rule  $y = 2x + 1$ .

$x$	1	2	3
$y$	3	5	7

---

33. Complete the values in the table using the rule  $y = (x + 1)^2$ .

$x$	1	2	3
$y$	4	9	16

---

34. Solve the equation  $a + 12 = 25$  to find the value of  $a$ .

$$a = \boxed{13}$$

---

35. Solve the equation  $9k = 72$  to find the value of  $k$ .

$$k = \boxed{8}$$

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# Lithgow High School

Year 8 Mathematics Test –  
Equations, Inequations and  
Formulae

## Calculator Test

Name \_\_\_\_\_

1. What number is missing from the sentence?

$$18 + \boxed{?} = 36$$

54

18

16

2

2. Part of the solution to the equation  $3x = 2.4$ , shown below has been smudged?

$$3x = 2.4$$

$$x = \text{[smudged]}$$

$$x = 0.8$$

What is the missing line?

$$x = 2.4 \times 3$$

$$x = 2.4 - 3$$

$$x = 2.4 \div 3$$

$$x = 2.4 + 3$$

3. Give the solution to:

$$m - 24 = 35$$

$$m = \boxed{59}$$

---

4. Which is the correct solution to:

$$x + 24 = 16$$

$$x = -8$$

$$x = 1.5$$

$$x = 8$$

$$x = -1.5$$

-1-

5. Give the solution to:

$$\frac{c}{8} = -32$$

$$c = \boxed{-256}$$


---

6. What number is missing from the sentence?

$$8 \times \boxed{?} - 12 = 68$$

$20\frac{1}{2}$

$-3\frac{1}{2}$

10

7

---

7. Which line in the solution to the equation  $5x + 3 = 28$  contains an error?

$$5x + 3 = 28$$

- |        |                    |
|--------|--------------------|
| Line 1 | $5x = 28 + 3$      |
| Line 2 | $5x = 31$          |
| Line 3 | $x = \frac{31}{5}$ |
| Line 4 | $x = 6\frac{1}{5}$ |

Line 1

Line 2

Line 3

Line 4

---

8. Solve :

$$6k - 5 = 13$$

$$k = \boxed{3}$$


---

9. Solve the equation below, writing your solution as a fraction :

$$7r + 5 = 11$$

$$r = \frac{\boxed{6}}{\boxed{7}}$$


---

10. Solve the equation below, writing your answer as a mixed number:

$$7d = 3d - 15$$

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

11. What number is missing from the sentence?

$$\frac{?}{8} + 6 = 9$$

39

48

24

120

12. Which line in the solution to the equation  $5x + 2(x-1) = 12$  contains an error?

$$5x + 2(x-1) = 12$$

Line 1  $5x + 2x - 2 = 12$

Line 2  $7x - 2 = 12$

Line 3  $7x = 10$

Line 4  $x = \frac{10}{7}$

Line 1

Line 2

Line 3

Line 4

13. Solve for  $y$ :

$$8y - 6 = 3y + 9$$

$$y = 3$$

14. Which is the correct solution to the equation :

$$2(3x - 6) = 4$$

$$x = 2\frac{1}{2}$$

$$x = 2\frac{1}{3}$$

$$x = 2\frac{3}{4}$$

$$x = 2\frac{2}{3}$$

15. Solve for  $e$  :

$$\frac{e}{6} - 5 = 2$$

$$e = \boxed{42}$$


---

16. Which is the correct solution to the equation :

$$\frac{4x - 6}{7} = -2$$

$$x = -2$$

$$x = 2$$

$$x = 3$$

$$x = -3$$



---

17.

Which line in the solution to the equation  $\frac{4a}{5} = \frac{3a}{2} - 7$  contains an error?

$$\frac{4a}{5} = \frac{3a}{2} - 7$$

Line 1  $10 \times \frac{4a}{5} = 10 \times \frac{3a}{2} - 10 \times 7$

Line 2  $8a = 15a - 70$

Line 3  $7a = -70$

Line 4  $a = -10$

Line 1

Line 2

Line 3

Line 4



---

18. Solve for  $u$  :

$$\frac{2u}{3} - \frac{u}{4} = u - 14$$

$$u = \boxed{24}$$


---

19. Which number below could not be used to complete the sentence?

$$4 \times \boxed{?} + 3 \leq 12$$

$$\begin{matrix} 3 \\ \text{---} \\ \boxed{?} \end{matrix}$$

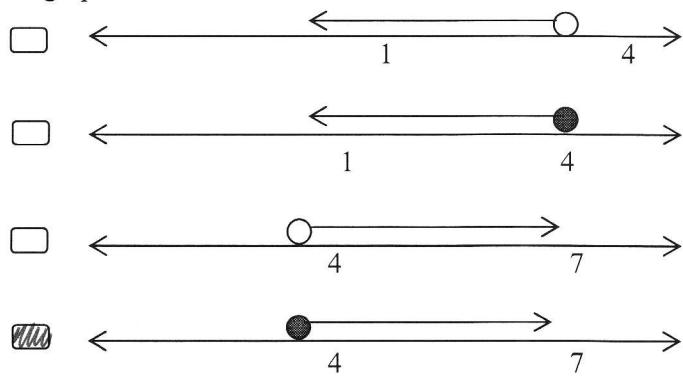
$$\begin{matrix} 2 \\ \text{---} \\ \text{---} \end{matrix}$$

$$\begin{matrix} 0 \\ \text{---} \\ \text{---} \end{matrix}$$

$$\begin{matrix} -1 \\ \text{---} \\ \text{---} \end{matrix}$$


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20. The graph of the solution to  $2x \geq 8$  is :



21. Write two numbers which could be used to make this sentence true.

$$2 \times (\boxed{?} + 1) \geq 12$$

5 or  6

or any number  $x \geq 5$ .

22. Which is the solution to  $4m - 5 > 13 - 2m$  ?

$m < 3$

$m < 9$

$m > 3$

$m > 9$

---

23. Use the formula  $v = u + at$  to find the value of  $v$ , when  $u = 5$ ,  $a = -4$  and  $t = 7$ .

$$v = \boxed{-23}$$

24. Use the formula  $s = \frac{n}{2}(a + l)$  to find the value of  $l$ , when  $n = 8$ ,  $a = 3$  and  $s = 108$ .

$l = 18$

$l = 21$

$l = 24$

$l = 15$

---

25. The formula  $C = \frac{5}{9}(F - 32)$  is used to convert between temperatures in degrees Celsius (C) and degrees Fahrenheit (F). Find the Fahrenheit equivalent of  $35^{\circ}$  Celsius.

$$35^{\circ} \text{ C} = \boxed{95}^{\circ}\text{F}$$

# High School

Year  
8

Test – Algebraic Techniques,  
Products and Factors

Non Calculator Test.

Name \_\_\_\_\_

1. The expression  $x + 7x - 5x$  when simplified completely is

$5x$

$4x$

$3x$

$2x$

2.  $2xy + xy - 5xy =$

$3xy$

$2xy$

$-3xy$

$-2xy$

3. Simplify  $3a + 7b + 2a - 3b$  completely.

$5a + 4b$

4.  $m + 8n - 5m - 3n =$

$4m + 5n$

$5n - 4m$

$4m - 5n$

$-5m + 5n$

5. Simplify  $3a \times 2b$

$6ab$

6. Simplify  $\frac{12m^2n}{3mn}$

$4m$

7.  $2x^4 \times 3x^6 =$

$5x^{10}$

$6x^{24}$

$5x^{24}$

$6x^{10}$

8.  $36a^{16} \div 4a^4 =$

$9a^{12}$

$32a^{12}$

$9a^4$

$32a^4$

9.

$$\frac{6c^2d \times 10cd}{15c^2}$$

$4c^2d$

$4cd^2$

$4cd$

$4c^2d^2$

10. Which of the following does **not** simplify to  $10xy$ ?

$5x \times 2y$

$10x + 10y$

$\frac{20xy}{2}$

$3xy + 7xy$

11.

$$\frac{3c}{10} + \frac{c}{10} = \boxed{\frac{2c}{5}}$$

12.

Simplify  $\frac{a}{4} + \frac{3a}{8}$

$\frac{a}{2}$

$\frac{5a}{8}$

$\frac{a}{3}$

$\frac{5a}{4}$

13.

$$\frac{3p}{4q} \times \frac{1}{pq} = \boxed{\frac{3}{4q^2}}$$

14.

$$\frac{3e}{10f^2} \times \frac{5f}{2e} = ?$$

$\frac{3}{4f}$

$\frac{3f}{4e}$

$\frac{15ef}{20ef}$

$\frac{3}{40f}$

15.

$$-12m^2n =$$

$-3 \times -4 \times m^2 \times n$

$-3m \times -4mn$

$-4mn \times 3mn$

$-6m \times 2mn$

16.

Expand  $3(x + 4)$

$3x + 12$

17. Expand  $a(a + b)$

$$a^2 + ab$$

18. When  $3a(2m - 5)$  is expanded, the result is

$$6am - 15a$$



$$6m - 15am$$



$$6a - 15am$$



$$3am - 10a$$



19. Expand  $4p(2p - 3pq)$

$$8p^2 - 12p^2q$$

20. When  $-2pq(p - 2q)$  is expanded, the result is

$$-2p^2q - 4pq^2$$



$$2p^2q - 4pq^2$$



$$-2pq + 4pq$$



$$-2p^2q + 4pq^2$$



21. Factorise  $5z - 20$

$$5(z - 4)$$

22. Factorise  $p^2 - 8pq$

$$p(p - 8q)$$

23. When  $12a^2 - 8ab$  is fully factorised, the result is

$$2a(6a - 2b)$$



$$4a(3a - 2b)$$



$$4a(3 - 2b)$$

$$2a(6 - 4b)$$



24. Factorise  $12a^2b - 18ab^2$

$$6ab(2a - 3b)$$

25. Which of the following, when expanded gives  $-25mn^2 - 30n^2$ :

$$5n^2(5m - 6)$$



$$-5n^2(5m - 6)$$



$$-5n^2(5m + 6)$$



$$-5n(5m + 6n)$$



26. When  $a = 3$  and  $b = -6$ , the value of  $a^2 + b^2 =$

$$-6$$



$$-27$$



$$45$$



$$27$$



27. When  $m = -2$  and  $u = 3$ , the value of  $2m u^2 =$

144  
36  
-72  
-36  

28. When  $x = 2$ ,  $y = -4$  and  $z = -6$ , the value of  $\frac{2xz}{y} =$

6  
48  
4  
20  

29. Complete the missing value in the table below.

$x$	$2x + 3$
1	5
2	7
3	9

30. Which equation describes the relationship between  $x$  and  $y$ ?

$x$	1	2	3
$y$	1	4	7

$y = 3x + 2$

$y = 3x - 2$

$y = 2x - 3$

$y = x - 2$

31. Which algebraic statement could be used to describe the relationship "To get  $y$ , you double  $x$  and take away 5."

$y = 2 + x - 5$

$y = 5 - 2x$

$y = 2x - 5$

$y = 5x - 2$

32. The cost in cents ( $C$ ) of hiring a taxi cab to travel a distance in kilometres ( $d$ ) is given by the relationship:

$C = 80d + 250$

*Complete the statement below*

The cost is found by  the distance by

and adding .

# High School

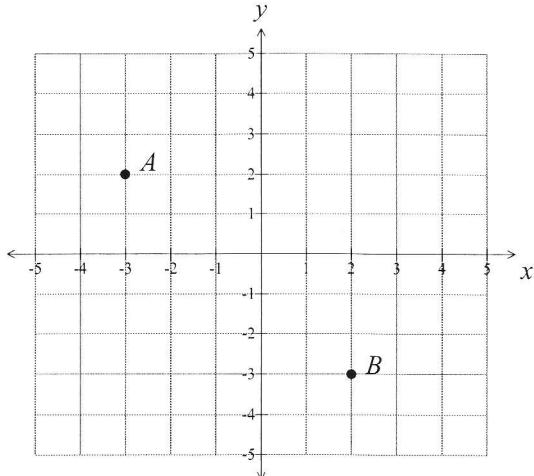
Year  
8

## Mathematics Test – Number Plane and Linear Relations

### Calculator Test

Name

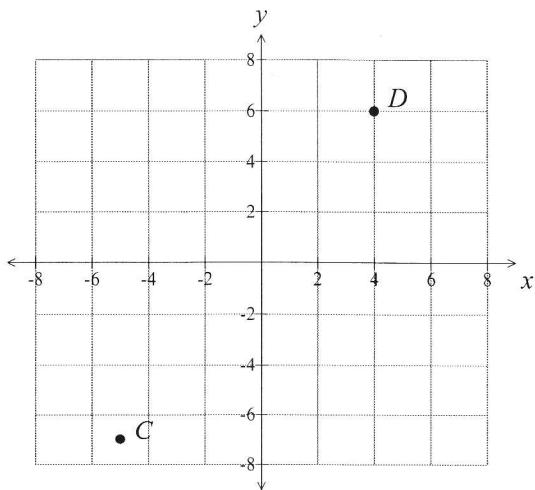
1.



The points  $A$  and  $B$  are described by the ordered pairs

- $A (2, -3)$  and  $B (-3, 2)$         $A (-3, 2)$  and  $B (2, -3)$   
  $A (-3, 2)$  and  $B (-3, 2)$         $A (3, 2)$  and  $B (2, 3)$
- 

2.



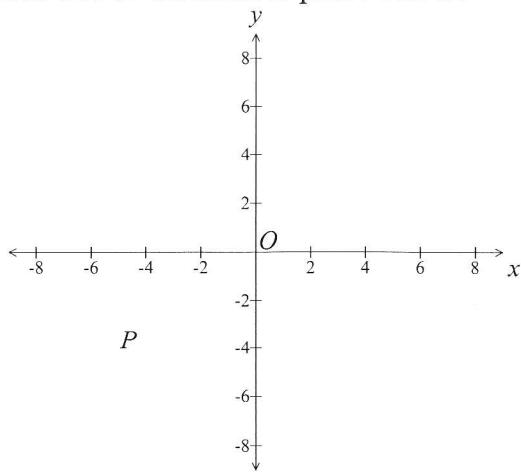
Write down the ordered pairs that describe the position of the points  $C$  and  $D$ .

$C$  (-5, -7)

$D$  (4, 6)

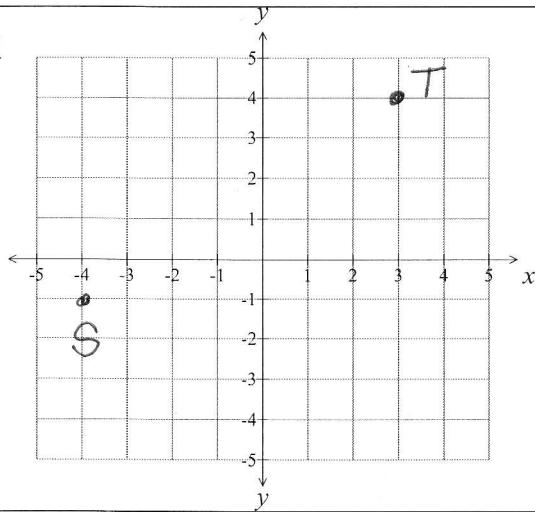
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3. Which statement is true of the number plane below?

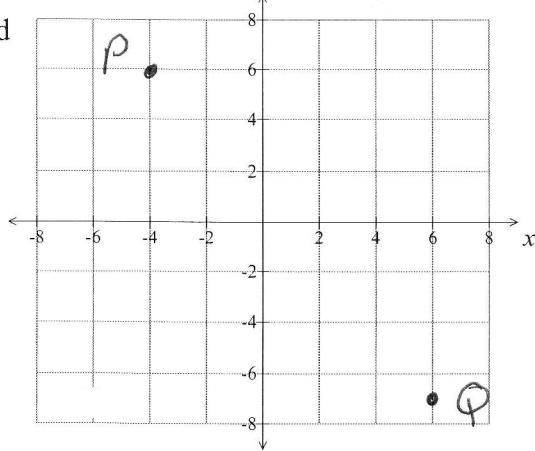


- O is the origin and P lies in the 2<sup>nd</sup> quadrant.
- P is the origin and O lies in the 3<sup>rd</sup> quadrant.
- O is the origin and P lies in the 3<sup>rd</sup> quadrant.
- O is the origin and P lies in the 1<sup>st</sup> quadrant.

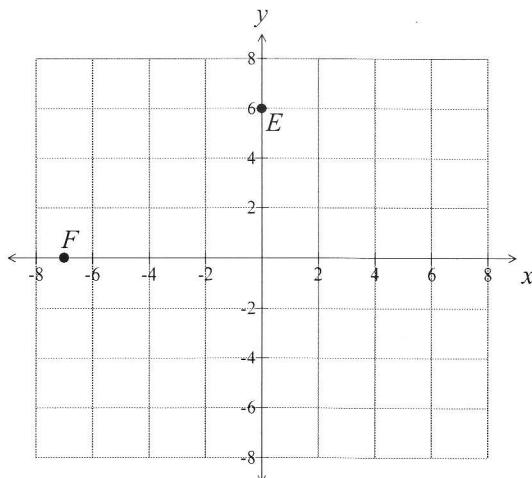
4. Mark and label the points T (3, 4) and S (-4, -1) on the number plane.



5. Mark and label the points P (-4, 6) and Q (6, -7) on the number plane.



6.



Write down the ordered pairs that describe the position of the points E and F.

E

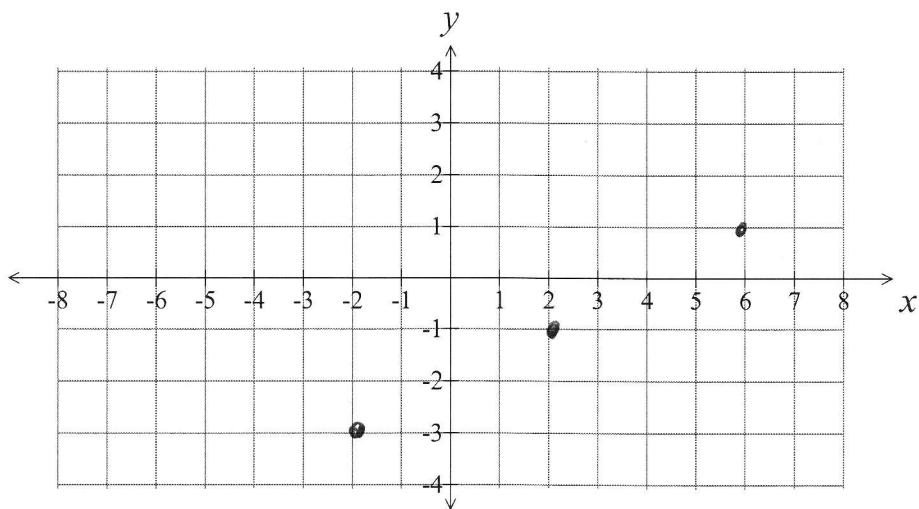
$$(0, 6)$$

F

$$(-7, 0)$$

7. The equation  $y = 0.5x - 2$  is used to produce the table of ordered pairs below. Graph the ordered pairs on the number plane.

$x$	-2	2	6
$y$	-3	-1	1



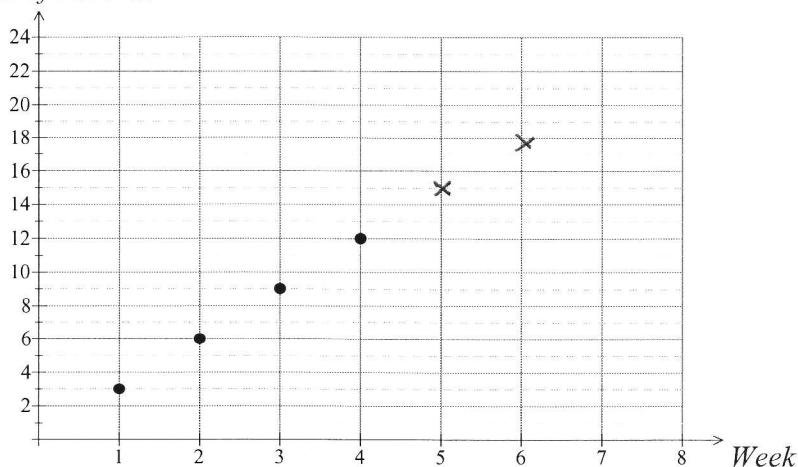
8. Use the equation  $y = 4x - 3$  to complete the table of ordered pairs.

$x$	-1	0	2
$y$	-7	-3	5

**Question 9 – 12 refer to the information below.**

Sharon starts to collect old vinyl records. She buys the same number of records each week from a local market. The graph below shows the number of vinyl records in her collection in weeks 1 to 4.

*Number of Records*



9. How many records did Sharon have in Week 3?

7

8

9

10

10. How many records would she have in Week 7, if she maintains this pattern of collecting?

21 records.

11. On the graph mark the number of records Sharon would have in Week 5 and Week 6 if she maintains this pattern of collecting.

*x      x      on graph.*

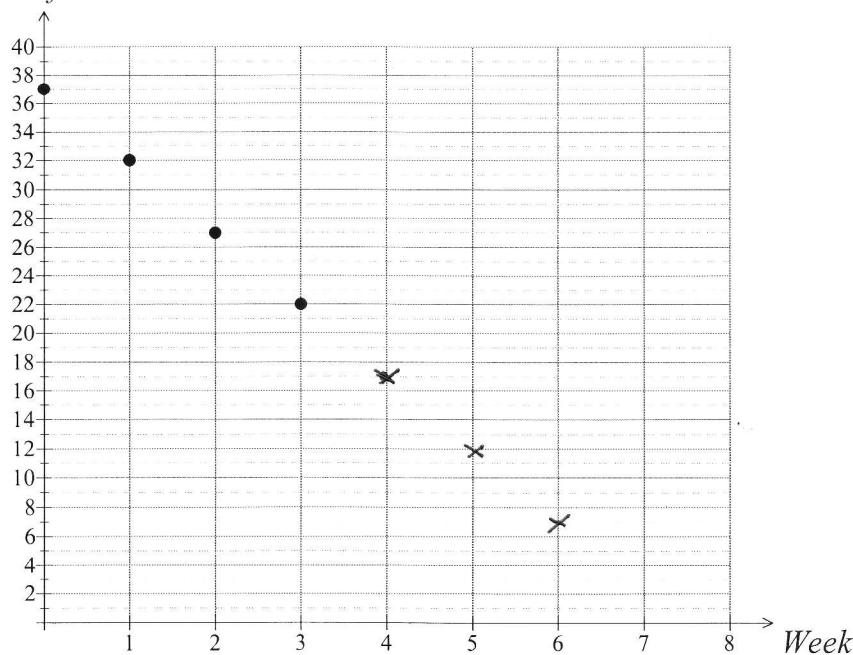
12. Describe in words the relationship between the Week number and the number of records collected.

The number of records = 3  $\times$  Week Number

**Questions 13 – 16 refer to the information below.**

Zak has some comic books in his bookshelf. He decides to take the same number of comic books to the local market each week and sell them for pocket money. The graph below shows the number of comics on his shelf from Week 0 (before he sold any comics) up to Week 3.

*Number of Comics*



13. How many comics did Zak have on his bookshelf before he started selling them?

37

comics.

14. In which week were there 27 comics on his shelf?

Week 2

15. On the graph, mark the number of comics that would be left on Zak's bookshelf in Week 6, Week 7 and Week 8, if he maintains this pattern of selling his comics?

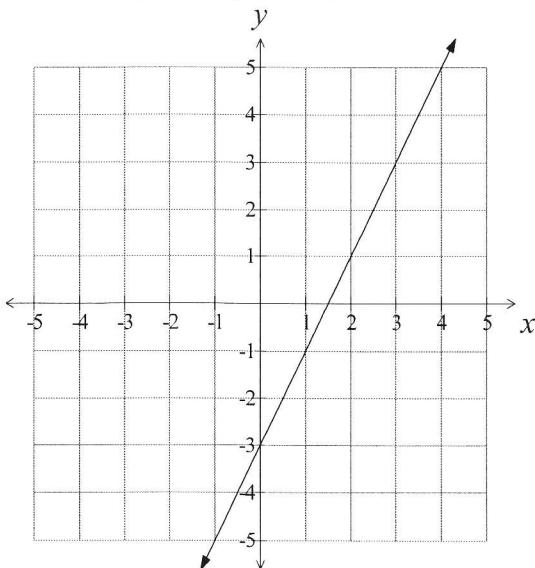
x on  
graph

16. Complete the statement below to describe the relationship between the Week number and the number of comics on Zaks shelf.

The number of comics = 37 – 5 × Week Number.

**Questions 17 – 19 refer to the graph below.**

The graph shows the line represented by the equation  $y = 2x - 3$ .



17. Which point does **not** lie on the line  $y = 2x - 3$ ?

$$(0, -3)$$

$$(2, 1)$$

$$(0, 1 \frac{1}{2})$$

$$(1, -1)$$

18. What is the value of  $x$  when  $y = 2$  for the equation  $y = 2x - 3$ ?

$$x = \boxed{2 \frac{1}{2}}$$

19. Which equation describes the ordered pairs in the table below?

$x$	1	2	3
$y$	1	3	5

$$y = 3x - 2$$

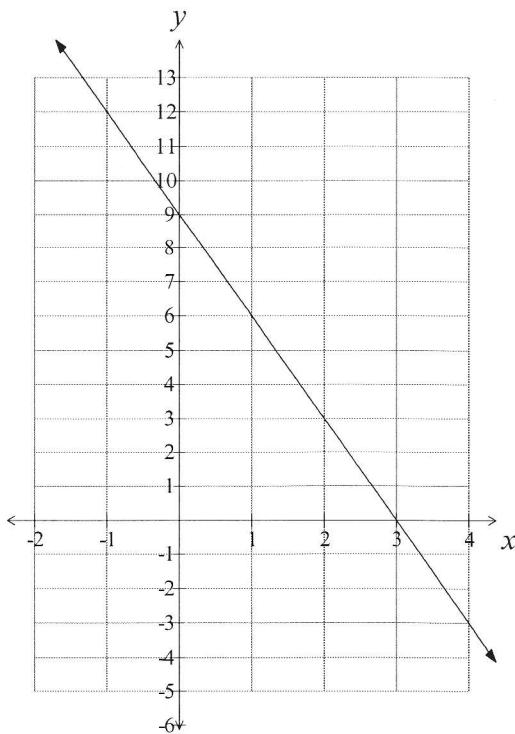
$$y = x + 1$$

$$y = x$$

$$y = 2x - 1$$

**Questions 20 – 22 refer to the graph below.**

The graph shows the line represented by an equation.



20. Complete the table below for the line shown.

$x$	1	2	3
$y$	6	3	0

21. Which equation describes the line shown?

$y = 3x + 9$

$y = -3x + 9$

$y = -2x + 8$

$y = x + 1$

22. Which ordered pair does not lie on the line shown?

(9, 0)

(-1, 12)

(0, 9)

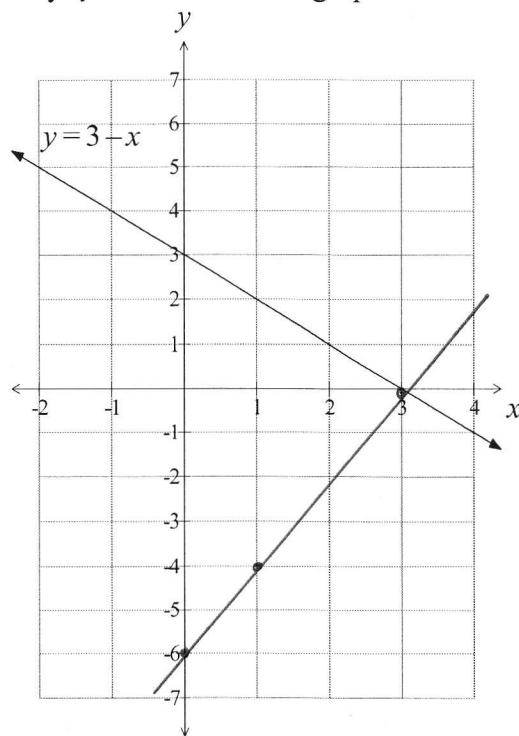
(4, -3)

**Questions 23 – 25 relate to the equation  $y = 2x - 6$ .**

23. Complete the table below for the equation  $y = 2x - 6$ .

$x$	0	1	3
$y$	-6	-4	0

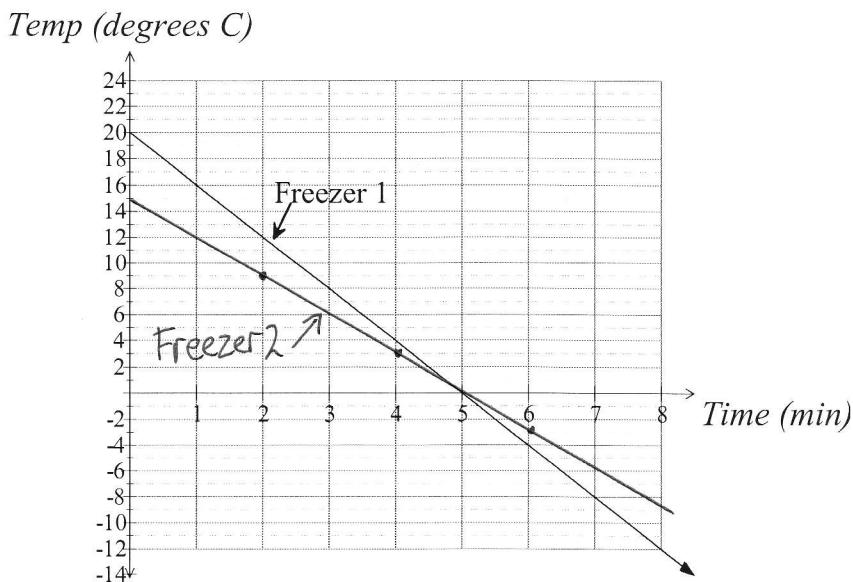
24. Draw the line represented by  $y = 2x - 6$  on the graph below.



25. The line  $y = 3 - x$  is also shown on the graph, what is its point of intersection with the line  $y = 2x - 6$  ?

(3, 0)
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Questions 26 – 30 refer to the graph below, which shows the temperature in a freezer (called Freezer 1) after it is turned on.



26. Complete the three values in the table below.

Time	2	4	6
Temperature	12	4	-4

27. What was the temperature of the freezer, when it was turned on?

20 °C

28. When did the temperature reach freezing point ( $0^{\circ}\text{C}$ )

After 5 minutes.

29. A second freezer (Freezer 2) was at  $15^{\circ}\text{C}$  when it was turned on, and cooled by three degrees each minute. Complete the table below for Freezer 2.

Time	2	4	6
Temperature	9	3	-3

30. Plot the line for Freezer 2 on the graph above