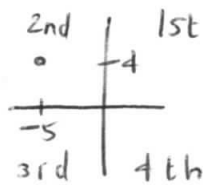


- 1 The Cartesian coordinate $(-5, 4)$ is in which quadrant?

- A 1
 B 2
 C 3
 D 4
 E None of the above



- 2 For the rule $y = 3x - 2$, what is y when $x = 2$?

- A -2
 B 0
 C 1
 D 2
 E 4

$$y = 3 \times 2 - 2 = 4$$

- 3 What is the gradient of the linear rule $y = 8x - 3$?

- A -3
 B 8
 C -8
 D 1
 E None of the above

- 4 Consider a linear graph which goes through the points $(5, -3)$ and $(0, 2)$. The gradient of this line is:

- A 5
 B -5
 C 1
 D -1
 E $\frac{5}{3}$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - (-3)}{0 - 5} = \frac{5}{-5}$$

- 5 The y -intercept of the rule $y = 5x - 6$ is: -6

- A $y = 5$
 B $y = -6$
 C $x = \frac{6}{5}$
 D $x = -6$
 E $x = 5$

- 6 The x -intercept of the rule $y = 5x - 6$ is:

- A $y = 5$
 B $y = -6$
 C $x = \frac{6}{5}$
 D $x = -6$
 E $x = 5$

$$5x - 6 = 0 \\ x = \frac{6}{5}$$

- 7 A straight line passes through the points $(2, 1)$ and $(5, 4)$. Its gradient is:

- A 1
 B 2
 C -1
 D -2
 E None of the above

$$m = \frac{4 - 1}{5 - 2} = \frac{3}{3} = 1$$

- 8 The rule for a line whose gradient is -4 and y -intercept $= 8$ is:

- A $y = -4x + 32$
 B $y = -4x + 8$
 C $y = 4x - 32$
 D $y = 4x - 8$
 E $y = -4x - 2$

$$y = mx + c \\ y = -4x + 8$$

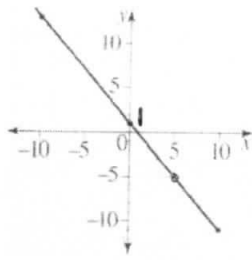
- 9 Which of the following would be a member of the family of curves defined

by: $y = x + 1$
 $y = x + 2$
 $y = x + 3 \dots ?$

- A $y = -x + 1$
 B $y = -x + 4$
 C $y = 2x - 4$
 D $y = x + 7$
 E $y = 2x + 1$

3 Calculate the gradient of the line shown.

3



$$m = \frac{-6}{5}$$

OR use $(x_1, y_1) = (0, 1)$
 $(x_2, y_2) = (5, -5)$

$$m = \frac{-5 - 1}{5 - 0} = \frac{-6}{5}$$

4 Find the gradient of each of the following lines joining the two points.

4

(a) (3, 1) and (5, 9)

$$(a) m = \frac{9 - 1}{5 - 3} = \frac{8}{2} = 4$$

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

$$(b) m = \frac{-5 - 4}{4 - (-2)} = \frac{-9}{6} = -\frac{3}{2}$$

5 State the gradient of the linear rules.

3

(a) $y = 6x + 18$

$$(a) m = 6$$

(b) $5x - 2y + 1 = 0$

$$(b) 5x + 1 = 2y$$

$$y = \frac{5x}{2} + \frac{1}{2}$$

$$\therefore m = \frac{5}{2}$$

- 6 For the linear rules in question 5 state the y-intercepts.

2

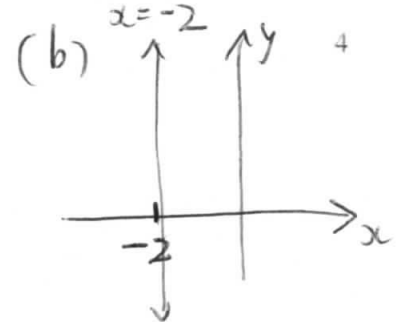
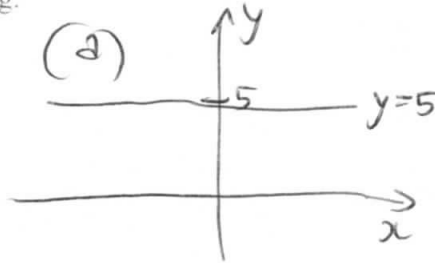
$$(d) c = 18$$

$$(b) c = \frac{1}{2}$$

- 7 Sketch graphs of the following.

(a) $y = 5$

(b) $x = -2$



- 8 Find the rule of the straight line whose x-intercept = 3 and y-intercept = -15.

sketch: 3

$$y = mx + c$$

$$\therefore y = \cancel{mx} - 15$$

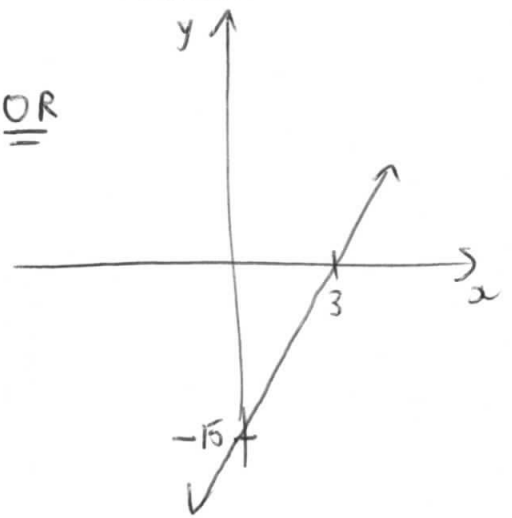
When $y = 0, x = 3$

$$\therefore 0 = 3m - 15$$

$$\therefore m = 5$$

Equation: $y = 5x - 15$

OR



From diagram:

$$m = \frac{15}{3} = 5$$

$$c = -15$$

$$\therefore y = 5x - 15$$

- 9 Find the rule of the line which passes through the two points (-6, 10) and (3, 37).

$$m = \frac{37 - 10}{3 - (-6)} = \frac{27}{9} = 3$$

$$y = 3x + c$$

Substitute (-6, 10)

$$10 = 3(-6) + c$$

$$\therefore 10 = -18 + c$$

$$c = 28$$

Equation: $y = 3x + 28$.

- 10 Find the rule of the straight line whose gradient is -2.4 and which passes through the point $(1, -2.5)$.

3

$$y = -2.4x + C$$

Sub. $(1, -2.5)$

$$-2.5 = -2.4 \times 1 + C$$

$$\therefore C = -0.1$$

$$y = -2.4x - 0.1$$

- 11 A textbook author has written 25 questions and can write a further 6 questions per hour. Predict the total number of questions written after an additional 12 hours, assuming a linear rule.

4

Let $y =$ no. of questions
let $x =$ no. of hours

~~$y = 6x + 25$~~
 $y = 6x + 25$

When $x = 12$, $y = 6 \times 12 + 25$
 $= 97$

Prediction: 97 questions.

- 12 After a refrigerator is switched on, the temperature inside it decreases in a linear manner. After 2 hours, the temperature inside the refrigerator is 15 degrees, and after 6 hours it is 5 degrees.

(a) Let $t =$ time, $T =$ temperature

~~$m =$~~ $(2, 15) \rightarrow (6, 5)$

$$m = \frac{5 - 15}{6 - 2} = \frac{-10}{4} = -2.5$$

$$\therefore 2.5^\circ/\text{hr}$$

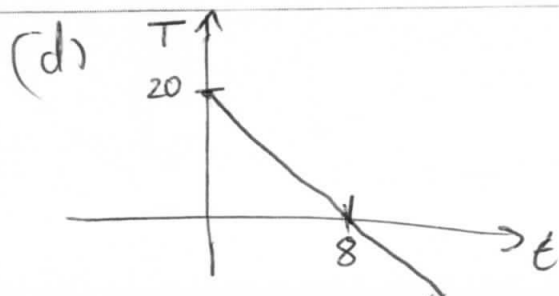
(b) $T = -2.5t + C$

Sub. $(2, 15) \therefore 15 = -2.5 \times 2 + C$
 $\therefore C = 20$

$$T = -2.5t + 20.$$

- At what rate is the temperature inside the fridge falling?
- Determine a linear rule which gives the temperature T after t hours.
- What was the initial temperature inside the fridge?
- Sketch the graph of this linear rule.

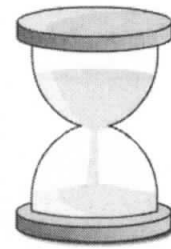
(c) 20 degrees.



Question 13

An egg timer contains grains of sand which pour through the neck of the timer from the top to the bottom of the timer in 3 minutes.

After it is turned over, the number N of grains in the top of the timer x minutes after it is turned over can be represented by a linear relationship. After half a minute has elapsed, there are 4,000 grains of sand left in the top. After 2 minutes have elapsed, there are 1,600 grains of sand left in the top.



- a. Determine a linear rule which gives the number N of grains of sand in the top of the egg timer after x minutes.

$$m = \frac{1600 - 4000}{2 - 0.5} = \frac{-2400}{1.5} = -1600$$

$$N = -1600x + C$$

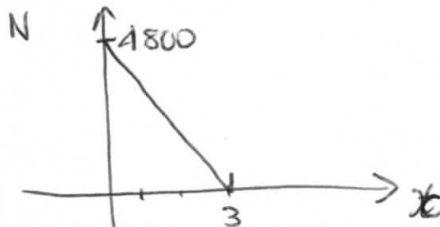
$$\text{Sub. } (0.5, 4000)$$

$$\therefore 4000 = -1600 \times 0.5 + C$$

$$\therefore C = 4800$$

$$N = -1600x + 4800$$

- b. Sketch the graph of this linear rule.



$$\text{Rule: } N = -1600x + 4800$$

- c. What is the x -intercept of this graph. What does it mean?

$x = 3, N = 0$. After 3 minutes, there are no grains in the top.

- d. How many grains of sand are in the top of the egg timer initially?

4,800

- e. After how long will there be 1000 grains of sand in the top?

$$1000 = 4800 - 1600x$$

$$-3800 = -1600x$$

$$x = \frac{38}{16} = \frac{19}{8} = 2\frac{3}{8} \text{ minutes}$$

Question 14

Adrian has just played a soccer game and needs a bath. He turns on the tap and water starts flowing into the bath tub at the rate of 0.75 litres per second. Initially, there was 20 litres of water in the tub. When full, the tub contains 250 litres.

- a. Write down a linear rule relating the volume V of water in the bath tub after t seconds.

$$V = 20 + 0.75t$$

- b. How long will it take to fill the bath tub at this rate?

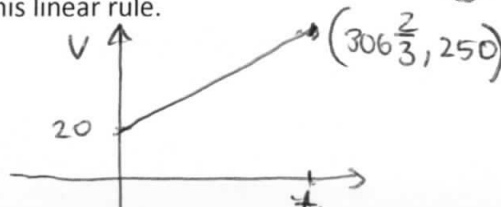
$$20 + 0.75t = 250$$

$$0.75t = 230$$

$$t = 230 \div \frac{3}{4}$$

$$t = 230 \times \frac{4}{3} = \frac{920}{3} = 306\frac{2}{3} \text{ sec.}$$

- c. Sketch the graph of this linear rule.



= 5 min and $6\frac{2}{3}$ sec.