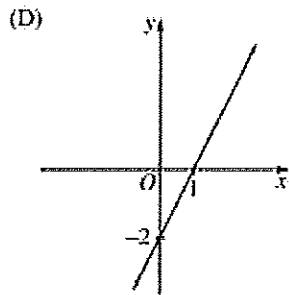
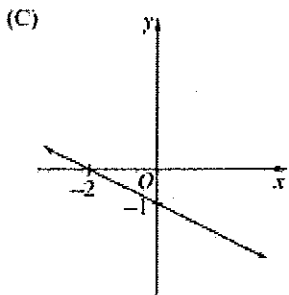
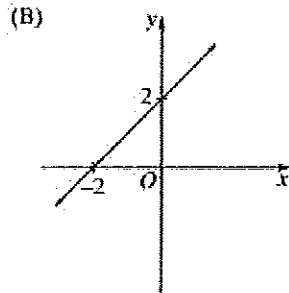
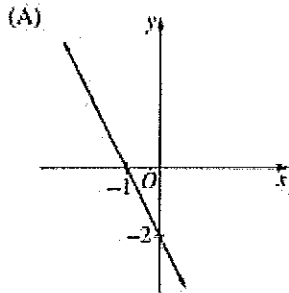


Linear functions

2014

Which of the following is the graph of $y = 2x - 2$?



Simplify $6w^3 \times \frac{1}{3}w^2$.

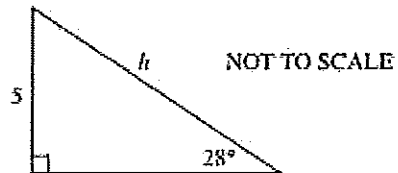
- (A) $2w^6$
- (B) $2w^8$
- (C) $18w^6$
- (D) $18w^8$

Expand $4x(7x^4 - x^2)$.

1

Calculate the value of h correct to two decimal places.

2



Solve the equation $\frac{5x+1}{3} - 4 = 5 - 7x$.

3

Solve these simultaneous equations to find the values of x and y .

$$y = 2x + 1$$

$$x - 2y - 4 = 0$$

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The cost of hiring an open space for a music festival is \$120 000. The cost will be shared equally by the people attending the festival, so that C (in dollars) is the cost per person when n people attend the festival.

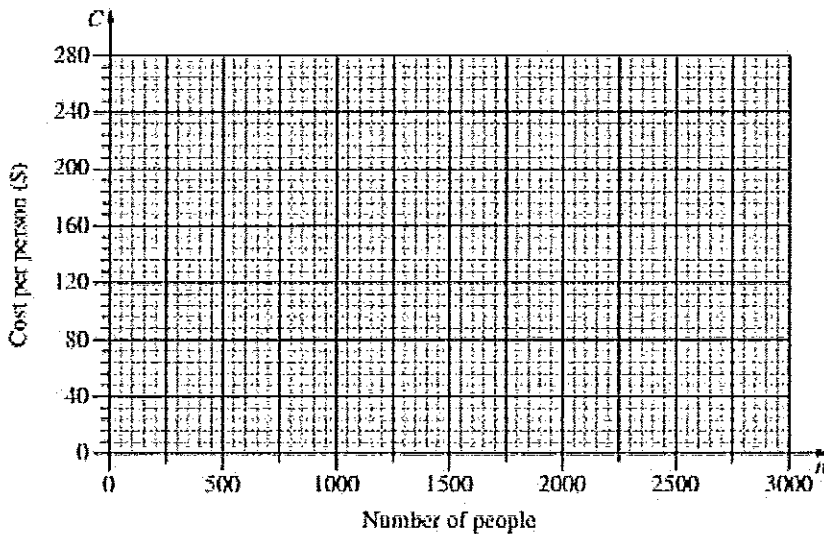
(i) Complete the table below by filling in the THREE missing values.

1

Number of people (n)	500	1000	1500	2000	2500	3000
Cost per person (C)				60	48	40

(ii) Using the values from the table, draw the graph showing the relationship between n and C .

2



i What equation represents the relationship between n and C ?

.....
.....
.....

j Give ONE limitation of this equation in relation to this context.

1

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.....

Is it possible for the cost per person to be \$94? Support your answer with appropriate calculations.

1

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2013

Which of the following is $\frac{12T^2}{3T \times 2W}$ in its simplest form?

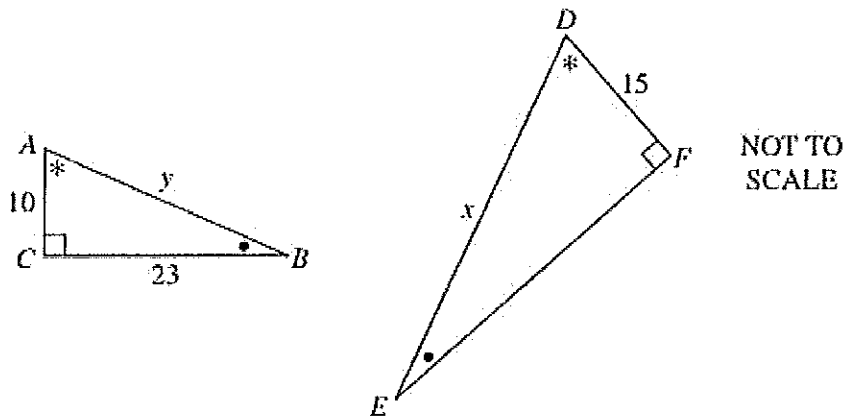
(A) $\frac{2T}{W}$

(B) $2TW$

(C) $\frac{8T}{W}$

(D) $8TW$

Triangles ABC and DEF are similar.



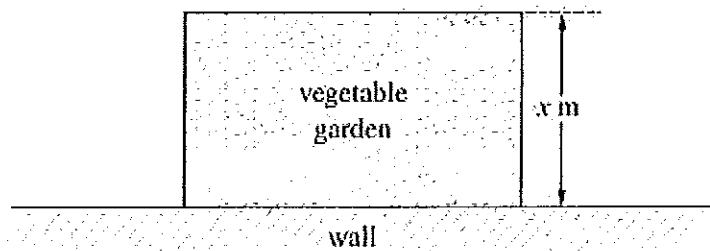
Which expression could be used to find the value of x ?

- (A) $y \times \frac{10}{15}$
- (B) $y \times \frac{10}{23}$
- (C) $y \times \frac{15}{10}$
- (D) $y \times \frac{23}{15}$

Which equation correctly shows r as the subject of $S = 800(1 - r)$?

- (A) $r = \frac{800 - S}{800}$
- (B) $r = \frac{S - 800}{800}$
- (C) $r = 800 - S$
- (D) $r = S - 800$

Leanne wants to build a rectangular vegetable garden in her backyard. She has 20 metres of fencing and will use a wall as one side of the garden. The plan for her garden is shown, where x metres is the width of her garden.



NOT TO SCALE

Which equation gives the area, A , of the vegetable garden?

- (A) $A = 10x - x^2$
- (B) $A = 10x - 2x^2$
- (C) $A = 20x - x^2$
- (D) $A = 20x - 2x^2$

Sarah tried to solve this equation and made a mistake in Line 2.

2

$$\frac{W+4}{3} - \frac{2W-1}{5} = 1 \quad \dots\dots\dots \text{Line 1}$$

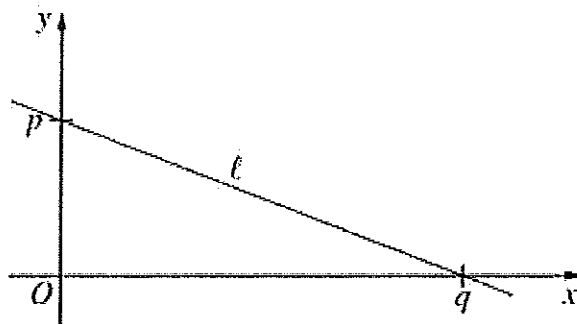
$$5W + 20 - 6W - 3 = 15 \quad \dots\dots\dots \text{Line 2}$$

$$17 - W = 15 \quad \dots\dots\dots \text{Line 3}$$

$$W = 2 \quad \dots\dots\dots \text{Line 4}$$

Copy the equation in Line 1 into your writing booklet and continue your solution to solve this equation for W . Show all lines of working.

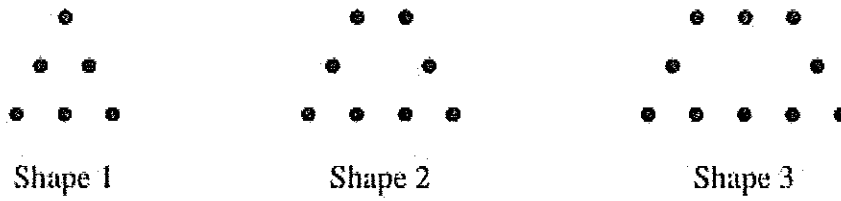
The line ℓ has intercepts p and q , where p and q are positive integers.



What is the gradient of line ℓ ?

- (A) $-\frac{p}{q}$
- (B) $-\frac{q}{p}$
- (C) $\frac{p}{q}$
- (D) $\frac{q}{p}$

Dots were used to create a pattern. The first three shapes in the pattern are shown.



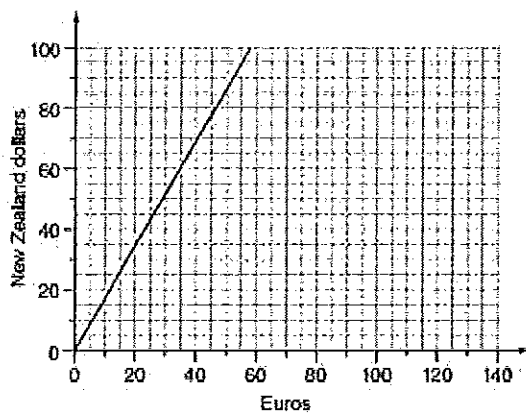
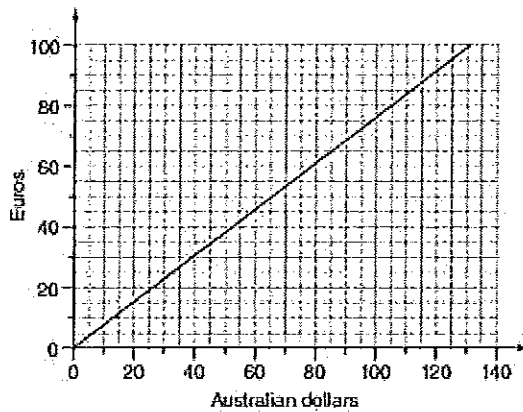
The number of dots used in each shape is recorded in the table.

Shape (S)	1	2	3
Number of dots (N)	6	8	10

How many dots would be required for Shape 156?

- (A) 316
- (B) 520
- (C) 624
- (D) 936

Conversion graphs can be used to convert from one currency to another.



Sarah converted 60 Australian dollars into Euros. She then converted all of these Euros into New Zealand dollars.

How much money, in New Zealand dollars, should Sarah have?

- (A) \$26
- (B) \$45
- (C) \$78
- (D) \$135

Which of the following expresses $2x^2(5-x) - x(x-2)$ in its simplest form?

- (A) $-2x^3 + 9x^2 + 2x$
- (B) $-2x^3 - 9x^2 - 2x$
- (C) $9x^2 - x + 2$
- (D) $9x^2 - x - 2$

Which of the following correctly expresses c as the subject of $E = mc^2 + p$?

(A) $c = \pm \sqrt{\frac{E - p}{m}}$

(B) $c = \pm \sqrt{\frac{E - p}{m}}$

(C) $c = \pm \sqrt{\frac{E}{m} - p}$

(D) $c = \pm \sqrt{\frac{E}{m} - p}$

Simplify fully $\frac{18ab}{3a^2} \times \frac{c}{b}$.

In 2010, the city of Thagoras modelled the predicted population of the city using the equation

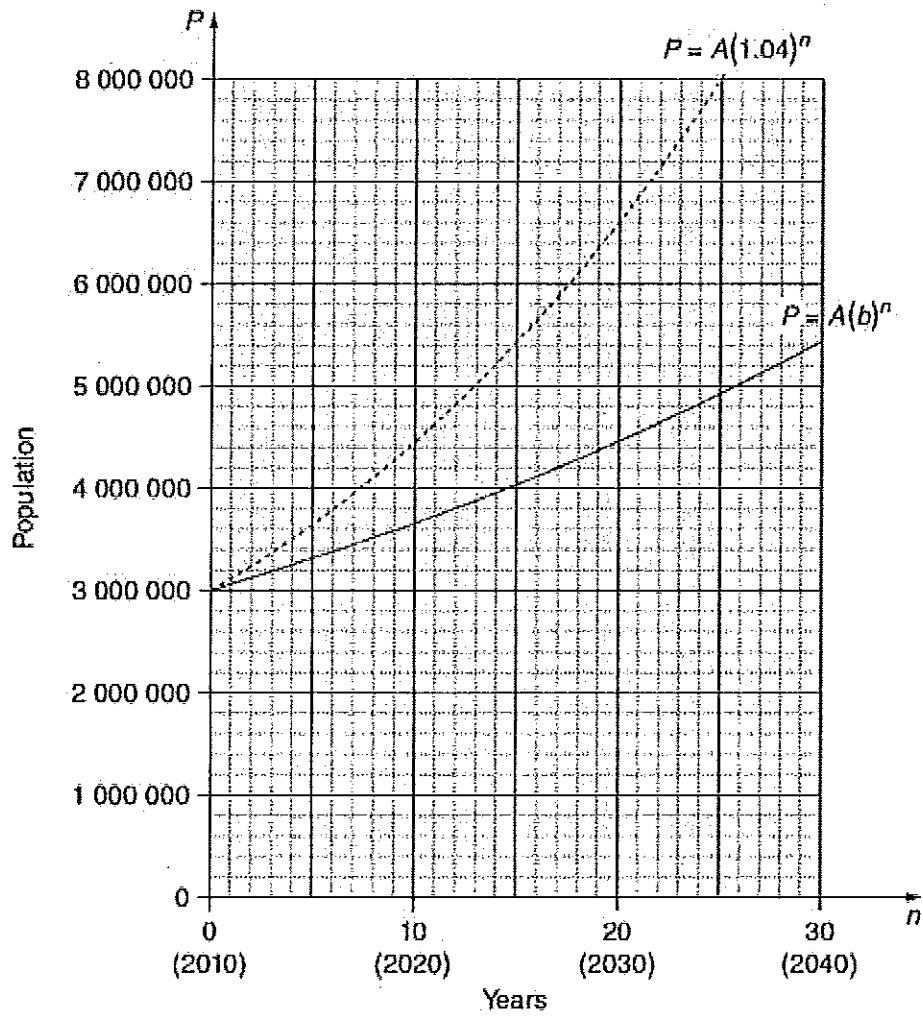
$$P = A(1.04)^n.$$

That year, the city introduced a policy to slow its population growth. The new predicted population was modelled using the equation

$$P = A(b)^n.$$

In both equations, P is the predicted population and n is the number of years after 2010.

The graph shows the two predicted populations.



- Predicted population if the policy had not been introduced
- Predicted population with the policy introduced

- (i) Use the graph to find the predicted population of Thagoras in 2030 if the population policy had NOT been introduced. 1
- (ii) In each of the two equations given, the value of A is 3 000 000. 1
What does A represent?
- (iii) The guess-and-check method is to be used to find the value of b , in $P = A(b)^n$.
- (1) Explain, with or without calculations, why 1.05 is not a suitable first estimate for b . 1
- (2) With $n = 20$ and $P = 4\,460\,000$, use the guess-and-check method and the equation $P = A(b)^n$ to estimate the value of b to two decimal places. Show at least TWO estimate values for b , including calculations and conclusions. 2
- (iv) The city of Thagoras was aiming to have a population under 7 000 000 in 2050. Does the model indicate that the city will achieve this aim? Justify your answer with suitable calculations. 2