



2.13 – Direct and inverse variation

Student name: _____ Score: _____

1. y varies as the square root of w .
When $w = 9$, $y = 4$.
Find the value of y when $w = 36$.

Answer (c) $y =$ [3]

2. y varies inversely as the square root of x .
When $x = 9$, $y = 2$.

(a) Find y in terms of x .

Answer(a) $y =$ [2]

(b) Find y when $x = 36$.

Answer(b) $y =$ [1]

(c) Write x in terms of y .

Answer(c) $x =$ [3]

(d) When y is multiplied by 0.5, x is multiplied by k .
Find the value of k .

Answer(d) [2]

3. The resistance, R ohms, of a standard length of wire varies inversely as the square of its diameter, d mm.

(a) The resistance of a standard length of wire of diameter 0.5 mm is 0.8 ohms.

(i) Find a formula for R in terms of d .

Answer(a)(i) $R =$ [3]

(ii) Find the resistance of a standard length of the same type of wire with diameter 2 mm.

Answer(a)(ii) ohms [1]

(iii) The resistance of a standard length of the same type of wire is 4 ohms.
Find the diameter of this wire.

Answer(a)(iii) mm [2]

(b) For a different type of wire the resistance of a standard length is 2 ohms.
Find the resistance of a standard length of this wire when the diameter is doubled.

Answer(b) ohms [2]

4. y varies inversely as the square root of x .
 $y = 16$ when $x = 4$.

(a) Find the value of y when $x = 16$.

Answer(a) $y =$ [3]

(b) Find the value of x when $y = 64$.

Answer(b) $x =$ [2]

(c) Find x in terms of y .

Answer(c) $x =$ [3]

5. (a) y varies inversely as the square root of x .
 $y = 5$ when $x = 9$.

(i) Find the value of y when $x = 25$.

Answer(a)(i) $y =$ [2]

(ii) Find the value of x when $y = 25$.

Answer(a)(ii) $x =$ [2]

(iii) Find x in terms of y .

Answer(a)(iii) $x =$ [2]

6. The frequency of a radio wave, f , is inversely proportional to the wavelength, L metres.
 A radio station broadcasts on a frequency of 93.7 and a wavelength of 3.2 m.

(a) Find a formula for f , in terms of L , writing any constants correct to 3 significant figures.

$f =$ [3]

(b) Chat Radio broadcasts with a wavelength of 2.8 m.

Find the frequency of Chat Radio.

..... [1]

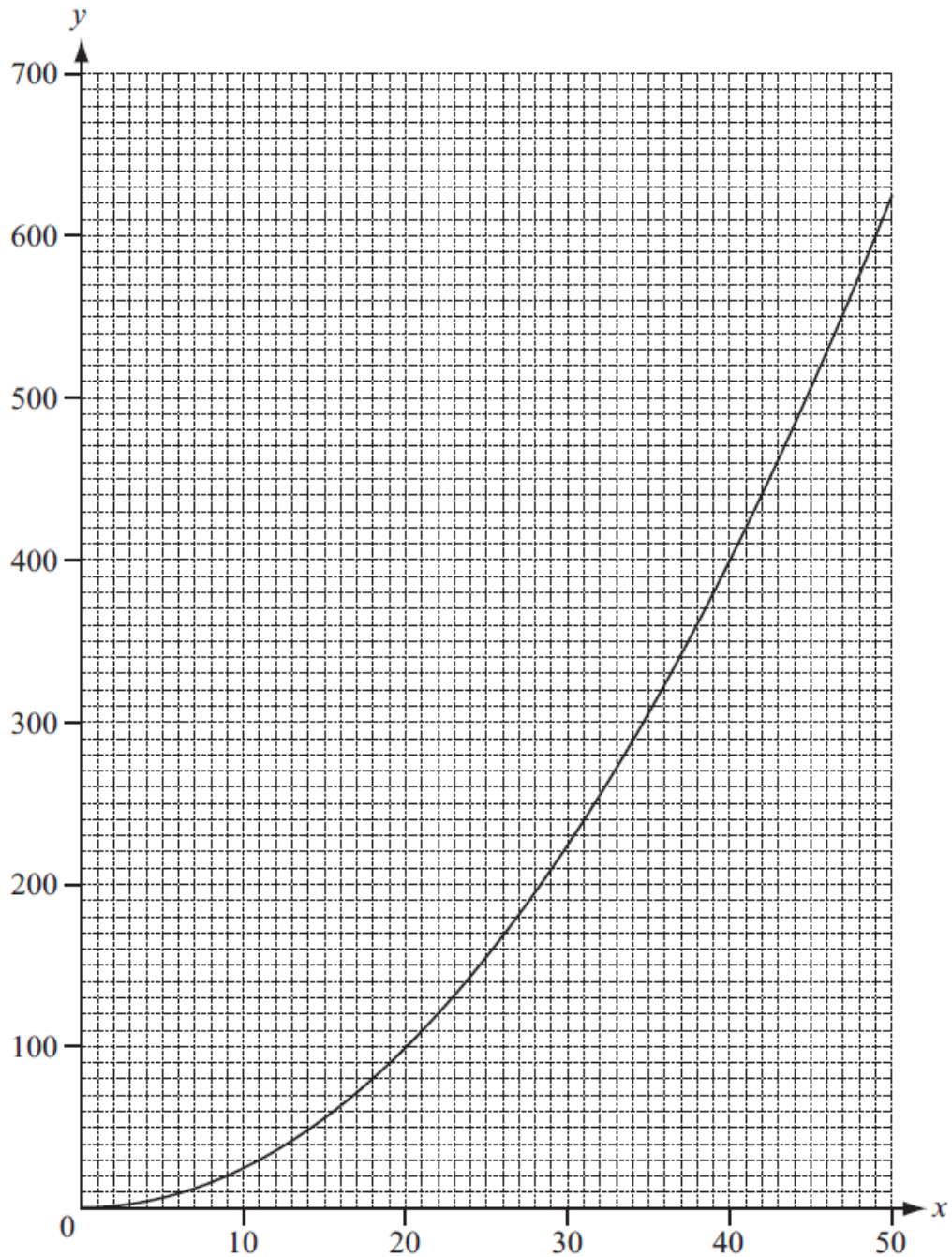
(c) Allsports Radio broadcasts with a frequency of 0.35 .

Find the wavelength of Allsports Radio.

..... m [2]



7.



The graph shows the result of an experiment measuring x and y .
It is known that y is directly proportional to the **square** of x .

Find the equation connecting y and x .

Answer [3]

8. F varies inversely as the square of d .
When $F = 9$, $d = 2$.

(a) Find F in terms of d .

Answer(a) $F =$ [2]

(b) Find the value of F when d is 3.

Answer(b) $F =$ [1]

9. $y \propto \frac{1}{\sqrt{x}}$

When $x = 4$, $y = 3$.

Find y when $x = 25$.

Answer [3]

10. y varies directly as x^2 , where x is a positive integer.
When $x = 3$, $y = 108$.

Calculate the value of x when $y = 300$.

Answer $x =$ [3]

11. y varies inversely as x^2 .
When $x = 2$, $y = 24$.

Find a formula for y in terms of x .

Answer $y =$ [2]



12. A travel agent displays the following exchange rates.

$$£1 = \$1.55$$

$$£1 = ¥9.3$$

(a) Change £200 into dollars (\$).

Answer(a) \$ [1]

(b) Find the number of Chinese yuan (¥) received in exchange for \$1.

Answer(b) ¥ [2]

13. y is proportional to the square root of x .
When $x = 16$, $y = 10$.

(a) Find an equation connecting x and y .

Answer(a) [2]

(b) Find the value of x when $y = 1$.

Answer(b) [2]

14. y varies directly as the square of x .

When $x = 8$, $y = 40$.

Find y when $x = 12$.

Answer [3]

$$y \propto \frac{1}{\sqrt{x}}$$

When $x = 4$, $y = 3$.

Find y in terms of x .

$y =$ [2]

15. An object moves in a circle with speed v .
The force on the object is F .
 F varies directly as v^2 .
When $v = 5$, $F = 200$.

(a) Find a formula for F in terms of v .

Answer(a) $F =$ [2]

(b) (i) Find F when $v = 2$.

Answer(b)(i) $F =$ [1]

(ii) Find v when $F = 968$.

Answer(b)(ii) $v =$ [1]

16. y varies inversely as the square root of x .
When $x = 16$, $y = 3$.

(a) Find y in terms of x .

Answer(a) $y =$ [2]

(b) Find y when $x = 36$.

Answer(b) [1]

17. y varies inversely as the square root of x .
When $x = 4$, $y = 3$.

Find

(a) y in terms of x ,

Answer(a) $y =$ [2]

(b) y when $x = 9$,

Answer(b) [1]

(c) x in terms of y .

Answer(c) $x =$ [2]



18. y varies inversely as \sqrt{x} .

When $x = 9$, $y = 3$.

(a) Find y in terms of x .

Answer(a) $y = \dots\dots\dots$ [2]

(b) Find the value of y when $x = 81$.

Answer(b) $\dots\dots\dots$ [1]

19. x varies as the square of y .

When $y = 4$, $x = 32$.

Find x when $y = 5$.

Answer $x = \dots\dots\dots$ [3]

20. y is inversely proportional to the square root of $(x - 3)$.

When $x = 7$, $y = 3$.

Find y in terms of x .

$y = \dots\dots\dots$ [2]

21. y is proportional to the square of x .

When $x = 4$, $y = 8$.

(a) Find an equation connecting y and x .

..... [2]

(b) Find the values of x when $y = 32$.

..... [2]