

May 06 4H

15. A ball is dropped from a tower.  
After  $t$  seconds, the ball has fallen a distance  $x$  metres.

$x$  is directly proportional to  $t^2$ .

When  $t = 2$ ,  $x = 19.6$

(a) Find an equation connecting  $x$  and  $t$ .

.....  
(3)

(b) Find the value of  $x$  when  $t = 3$

$x =$  .....  
(2)

(c) Find how long the ball takes to fall 10 m.

..... seconds  
(3)

(Total 8 marks)

Q15

May 07 3H

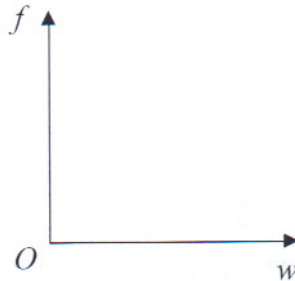
15. The frequency,  $f$  kilohertz, of a radio wave is inversely proportional to its wavelength,  $w$  metres.

When  $w = 200, f = 1500$

(a) (i) Express  $f$  in terms of  $w$ .

$f = \dots\dots\dots$

(ii) On the axes, sketch the graph of  $f$  against  $w$ .



(4)

(b) The wavelength of a radio wave is 1250 m. Calculate its frequency.

..... kilohertz  
(2)

(Total 6 marks)

Q15

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17. The distance,  $d$  kilometres, of the horizon from a person is directly proportional to the square root of the person's height,  $h$  metres, above sea level.  
When  $h = 225$ ,  $d = 54$

(a) Find a formula for  $d$  in terms of  $h$ .

$d = \dots\dots\dots$   
(3)

(b) Calculate the distance of the horizon from a person whose height above sea level is 64 metres.

$\dots\dots\dots$  kilometres  
(1)

(c) Calculate the height above sea level of a person, when the distance of the horizon is 61.2 kilometres.

$\dots\dots\dots$  metres  
(2)

(Total 6 marks)

Q17

16. Kate is going to mark some examination papers.

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When she marks for  $n$  hours each day, she takes  $d$  days to mark the papers.

$d$  is inversely proportional to  $n$ .

When  $n = 9$ ,  $d = 15$

(a) Find a formula for  $d$  in terms of  $n$ .

$$d = \dots\dots\dots (3)$$

(b) Kate marks for  $7\frac{1}{2}$  hours each day.

Calculate the number of days she takes to mark the papers.

$$\dots\dots\dots (2)$$

(Total 5 marks)

Q16

May 04 3H

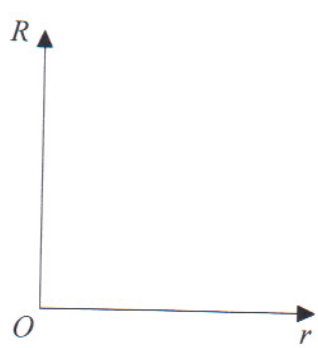
17. An electrician has wires of the same length made from the same material.  
The electrical resistance,  $R$  ohms, of a wire is inversely proportional to the square of its radius,  $r$  mm.  
When  $r = 2$ ,  $R = 0.9$

Leave blank

(a) (i) Express  $R$  in terms of  $r$ .

$R = \dots\dots\dots$

(ii) On the axes, sketch the graph of  $R$  against  $r$ .



(4)

One of the electrician's wires has a radius of 3 mm.

(b) Calculate the electrical resistance of this wire.

$\dots\dots\dots$  ohms  
(1)

Q17

(Total 5 marks)

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