18. Given that y is **inversely** proportional to x, and that $y = 3$ when $x = 10$,

(a) find an expression for y in terms of x,

[3]

(b) calculate y when $x = 1{\cdot}5$,

[1]

(c) calculate x when $y = 0{\cdot}5$.

[1]

15. Given that w is directly proportional to f^2, and that $w = 100$ when $f = 5$,

(a) find an expression for w in terms of f,

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[3]

(b) calculate w when $f = 4$,

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[1]

(c) calculate f when $w = 1600$.

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[2]

12. Given that y is inversely proportional to x^2, and that $y = 2$ when $x = 5$,

(a) find an expression for y in terms of x,

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[3]

(b) calculate

(i) the value of y when $x = 2$,

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.....

[1]

(ii) a value of x when $y = 0{\cdot}5$.

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[2]

12. Spheres are made of a particular metal. The mass, m grams, of such a sphere is directly proportional to the cube of the radius, r centimetres.

(a) Given that the mass of a sphere with radius 2 cm is 80 g, find an expression for m in terms of r.

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[3]

(b) Calculate

(i) the mass of a sphere with radius 4 cm,

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[1]

(ii) the radius of a sphere of mass 270 g.

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[2]

13. *(a)* A pebble is dropped from rest and falls a distance d metres in t seconds. The distance d is proportional to the square of the time t. Given that the pebble falls $1\frac{1}{4}$ metres in the first $\frac{1}{2}$ second, find an expression for d in terms of t.

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[3]

(b) (i) Calculate the distance that the pebble falls in the first 3 seconds.

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[1]

(ii) Calculate the time taken in seconds for the pebble to fall 405 metres from rest.

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[2]