Aberdare Community School

Mathematics Department

WJEC GCSE

Higher – Calculator

Algebra

Proportion

Name: .....

Set: .....

Date: .....

Teacher: .....

19. Given that y is inversely proportional to x^2, and that $y = 8$ when $x = 20$,

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

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[3]

(b) calculate

(i) y when $x = 4$,

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[1]

(ii) a value of x when $y = 32$.

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[2]

17. Given that y is inversely proportional to x^2, and that $y = 2$ when $x = 15$,

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

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[3]

(b) calculate y when $x = 10$.

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[1]

20. Given that y is inversely proportional to x, and that $y = 3$ when $x = 2$,

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

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[3]

(b) use the expression you found in *(a)* to complete the following table.

x	-1	2	
y		3	0·1

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[2]

14.

(b) Given that y varies inversely as x, and $y = 0{\cdot}3$ when $x = 10$, find the relationship between x and y.

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[3]

Examiner only

14. *(a)* Given that y is proportional to x^2, and that $y = 4$ when $x = 1$, find an expression for y in terms of x.

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[2]

Examiner only

14. *(a)* Given that y is inversely proportional to x, and that $y = 12$ when $x = 2$, find an expression for y in terms of x.

[3]

(b) Use the expression you found in *(a)* to complete the following table.

x	0·1	2	
y		12	8

[2]

Examiner only

13. A pebble is thrown vertically upwards.
It has an initial velocity of v metres per second.
The pebble reaches a maximum height of h metres, before falling vertically downwards.
It is known that h is directly proportional to v^2.

(a) Given that the pebble is thrown with an initial velocity of 10 m/s and reaches a maximum height of 5 metres, find an expression for h in terms of v.

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[3]

(b) Calculate the maximum height reached when the pebble is thrown with an initial velocity of 12 m/s.

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[2]

(c) Find the initial velocity of the pebble if the maximum height reached is 16 metres.

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[2]

Examiner only

11. *(a)* You are given that y is inversely proportional to x^2, and that $y = 100$ when $x = 2$.

(i) Find an expression for y in terms of x.

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(ii) Use the expression you found in (i) to complete the following table.

x	2	10	
y	100		$\frac{1}{4}$

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[5]

12. Given that y is proportional to x^2, and that $y = 4$ when $x = 0{\cdot}5$,

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

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[3]

(b) use the expression you found in *(a)* to complete the following table.

x	0·5	3	
y	4		6400

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[2]

Examiner only

12. Given that y is inversely proportional to x^2, and that $y = 8$ when $x = 0{\cdot}5$,

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

[3]

(b) use the expression you found in *(a)* to complete the following table.

x		0·2	0·5
y	800		8

[2]

Examiner only

13. A production line making chocolates sometimes develops a fault and shuts down.

The distance the chocolates travel towards the next process before shut down is d metres. The speed of the production line is v m/s.

When the fault occurs, it is noticed that the distance the chocolates travel towards the next process, is inversely proportional to the square of the speed of the production line.

The fault last occurred when the distance the chocolates moved on towards the next process was 8 m and the speed of the production line was 4 m/s.

(a) Find an expression for d in terms of v.

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[3]

(b) Calculate d when $v = 6$ m/s.

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[2]

(c) Calculate v when d is 25 cm.

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[3]

Examiner only

14. In an experiment, a scientist found that the force, F, between two particles was inversely proportional to the square of the distance, d, between them.
The units of force are newtons and the units of distance are millimetres.

When the particles were 5 mm apart the force between them was 8 newtons.
How far apart were the particles when the force between them was 12·5 newtons?

[6]

Examiner only

15. Given that g is directly proportional to t^2, and that $g = 450$ when $t = 7{\cdot}5$,

(a) find an expression for g in terms of t,

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[3]

(b) use the expression you found in *(a)* to complete the following table.

g		450	800
t	2·5	7·5	

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[2]

Examiner only

16. Results of an experiment have demonstrated that there is a relationship between two variables, f and g.
It has been shown that f is inversely proportional to the square of g.

(a) Which one of the following statements best describes the results of this experiment? You must explain your answer. [2]

Statement A: 'As g increases f increases at an even faster rate.'
Statement B: 'As g reduces, f also reduces.'
Statement C: 'As g increases, f decreases.'
Statement D: 'Variables f and g both change at the same rate.'

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(b) It was found that when $f = 4$, $g = 5$.
Write down an equation, in terms of f and g, expressing the relationship found in the experiment. [3]

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(c) Use the equation to complete the following table. [2]

g	$\frac{1}{2}$	5	.....
f	.....	4	0·01

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Examiner only

14. When a ball is dropped, the distance it drops, d, is directly proportional to the square of its time of flight, t.
It is found that a ball takes 1 second to drop 4·9 metres.

(a) Find an expression for d in terms of t. [3]

(b) Complete the following table. [3]

Distance, d, in metres	4·9		28·2
Time of flight, t, in seconds	1	2	

Turn over.

Examiner only

6. It is known that a is proportional to b.
The table shows some values for a and b.

a	b
7·5	3
30	12
40	16

Use the information given in the table to complete the following equations. [3]

$$a = \ldots\ldots\ldots\ldots \times b$$

$$b = \ldots\ldots\ldots\ldots \times a$$

Examiner only

16. Given that p is inversely proportional to r^2, and that $p = 6$ when $r = 3$, find an expression for p in terms of r. [3]

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