Multiple-choice section – choose the correct answer

Question 1 [3.1]

Simplified,  equals:

A *g*4 B  C  D 

Question 2 [3.6]

Expanded, (5 – 6*b*)2 is equivalent to:

A 25 – 6*b*2 B 36*b*2 – 60*b* + 25 C 25 – 36*b*2 D 25 – 30*b* + 36*b*2

Question 3 [3.5]

Expanded, 3(2*x* – 1) – 4(*x* – 7*m*) is equal to:

A 2*x* + 28*m* + 3 B 2*x* – 3 – 28*m* C 2*x* + 28*m* – 3 D 2*x* – 1 + 28*m*

Question 4 [3.7]

Fully factorising 3*p*2 – 15*p* + 27*ap*3 gives:

A 3*p*(9*ap*2 + *p* – 5) B 3(*p*2 – 15 + 9*ap*3) C 3*p*(*p* + 5 + 9*ap*2) D *p*(3*p* – 15 + 27*ap*2)

Question 5 [3.3]

How many significant figures does the number 0.030 80 have?

A 2 B 3 C 4 D 6

Question 6 [3.8]

The complete factorisation, using grouping, of 2*k*2 – 10 + 3*ck*3 – 15*ck* is:

A -(3*ck* + 2)(*k*2 + 5)

B (*k* – 5)(*k* + 5)(3*ck* – 2)

C *k*2(2 + 3*ck*) – 5(2 + 3*ck*)

D (3*ck* + 2)(*k* –)(*k* +)

Question 7 [3.1]

Simplified, (2*yz*3)3 × (*yz*)4 ÷ (3*y*2*z*2)2 equals:

A  B  C  D 

Question 8 [3.2]

The expression  simplifies to:

A  B  C  D 

Question 9 [3.4]

Rearranging the formula for the volume of a sphere, *V* = π*r*3, to make the radius *r* the subject of the equation, gives:

A  B  C  D 

Question 10 [3.2]

The fraction  is equivalent to:

A 2-2 B -22 C -41 D 

Multiple-choice results: \_\_\_ / 10

Short answer section

Question 11 5 marks [3.5, 3.6, 3.7]

Use words from the list below to complete the following sentences.

difference of two squares expand factorise perfect square expression quadratic trinomial

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *b*2 – 49 is an example of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.   
*h*2 + 2*mh* + *m*2 is an example of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because its first and last terms are squares and because the middle term is twice the product of the square roots of the first and third terms. This rule can be used to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ algebraic expressions.

Question 12 2 marks [3.5, 3.7]

Explain the difference between the instructions ‘factorise’ and ‘expand’. Use an algebraic expression to help you explain.

Question 13 4 marks [3.1]

Simplify each of the following.

(a) -4*bgh* × -11*bg*2

(b) 

Question 14 8 marks [3.2]

Simplify each of the following, leaving your answers in index form with positive powers.

(a) 

(b) (2*xy*2)3 × (*x*2*y*)5

(c) 55 × 35

(d) *q*7 ÷ *q*11

Question 15 3 marks [3.2]

Simplify each of the following.

(a) 100

(b) 4*r*0

(c) (13*s*)0

Question 16 6 marks [3.2]

Simplify each of the following, leaving your answers in index form with positive powers.

(a) 

(b) 

Question 17 4 marks [3.3]

(a) Write the number 92 017 000 in scientific notation.

(b) Write 3.2 × 104 as a number.

(c) Write the number 0.000 056 2 in scientific notation.

(d) Write 1.0809 × 10-5 as a number.

Question 18 1 mark [3.3]

Evaluate 3.42 × 10-3 × 3.8 × 107 – 8.706 × 10-1. Express your answer in scientific notation.

Question 19 3 marks [3.3]

**(a)** How many significant figures does the number 11.2580 have?

**(b)** How many significant figures does the number 0.0006 have?

**(c)** Round 13.9998 to 4 significant figures. Express your answer using scientific notation.

Question 20 3 marks [3.4]

(a) Rearrange the formula  to make *b* the subject.

(b) If *a* = 1, *p* = 5, *w* = 0 and *v* = 8, determine the value of *b*.

Question 21 3 marks [3.4]

The area of a trapezium is given by the rule *A* =  × (*a* + *b*) × *h*.

**(a)** Find the area of the trapezium with a height of 6 cm and parallel sides of 3 cm and 4 cm.

(b) Rearrange the formula to make the parallel side *a* the subject of the equation. Use your answer from part **(a)** to show that *a* = 3.

Question 22 5 marks [3.5]

Expand and simplify the following expressions.

(a) 5(*x* – 8*z*)

(b) -3*p*2(1 – 5*mp*)

(c) 2(*a* + 1) + 4(*a* + *b*)

Question 23 4 marks [3.5]

Expand and simplify each of the following.

(a) 2(*a* + 1) + 4(*a* + *b*)

(b) 2(11 – *a*)(*a* + 3)

Question 24 3 marks [3.5]

(a) Ryan has a rectangular piece of land 18 m by 16 m. Draw a diagram to represent this land and calculate its perimeter and its area.

(b) Ryan wishes to extend both the length and the width of this land by *d* metres. Draw a diagram to represent this extended land and write down an expanded and simplified expression for its perimeter and its area.

Question 25 4 marks [3.6]

Expand and simplify each of the following.

(a) (*b* + 2)2

(b) (3*n* – 4)2

Question 26 3 marks [3.6]

Expand and simplify each of the following.

(a) (*c* – *d*)(*c* + *d*)

(b) (2*w* + 3*q*)(2*w* – 3*q*)

Question 27 4 marks [3.6]

(a) Jack’s square piece of land has a length of *x* + 8 metres. Write an equation, in fully factorised form, for the area of this land. Then, expand the brackets and simplify this equation.

(b) If *x* = 16 m, find the perimeter and the area of this land.

Question 28 3 marks [3.7]

Fully factorise each of the following.

(a) 7*g*2*h* – 14*gh*2

(b) 9*y*3 – 27y2*z* + 36*y*

(c) *t*4 + 6*t*2 – 4*t*3

Question 29 4 marks [3.8]

Fully factorise each of the following.

(a) *cd* + 4*d* + 7*c* + 28

(b) 5*x* + 15 – 2*xy* – 6*y*

Short answer results: \_\_\_ / 72

Extended answer section

Question 30 5 marks [3.3]

Consider some very small micro-organisms.

(a) Amoeba A is 220 µm (micrometres) in length. 1 µm is equivalent to 1 millionth of a metre   
(10-6 m). Write amoeba A’s length in metres, expressing your answer in scientific notation.

(b) Amoeba B is 7.40 × 10-4 m in length. Convert this length to micrometres (µm).

(c) Complete the following table for amoebas C and D.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Amoeba | Micrometres (µm) | Metres (decimal) | Metres (scientific notation) | Millimetres |
| C |  | 0.0003 |  |  |
| D |  |  | 6.2 × 10-4 |  |

(d) What is the difference in length between amoeba D and amoeba A? Express your answer in millimetres in scientific notation.

Question 31 6 marks [3.4, 3.5]

(a) An artist’s customised rectangular of piece of paper has a perimeter of 120 cm. It has a length of *x* cm and a width of *y* cm. Write an equation for the perimeter of this customised piece of paper.

(b) Rearrange this equation to make *y* the subject.

(c) Write an equation for the area of the paper in terms of *x*.

(d) Expand this equation. Simplify if possible.

(e) Given that *x* = 25 cm, find the area and width of the piece of paper.

Extended answer results: \_\_\_ / 11

TOTAL test results: \_\_\_ / 93