Multiple-choice section – choose the correct answer

Question 1 [3.1]

Simplified, 18*m*8 ÷ 6*m*2 equals:

A 3*m*4 B 3*m*6 C 12*m*6 D 3*m*10

Question 2 [3.6]

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

A 25 – *b*2 B *b*2 – 25 C 25 + 10*b* + *b*2 D *b*2 – 10*b* + 25

Question 3 [3.5]

Expanded, -3(2*x* – 1) is equal to:

A 6*x* + 3 B 2*x* + 3 C -6*x* + 3 D 6*x* – 1

Question 4 [3.7]

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

A 3*p*(*p* – 5 + 9*ap*2) 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 307 080 have?

A 3 B 4 C 5 D 6

Question 6 [3.8]

The complete factorisation, using grouping, of *k*2 + 2*k* + 6*k* + 12 is:

A *k*(*k* + 8) +12

B 2(*k*2 + *k*)+ 6(*k* + 2)

C 6(*k* + 2) + *k*2

D (*k* + 6)(*k* + 2)

Question 7 [3.1]

Simplified,  equals:

A  B *y*2 C *y*3 D *y*3*z*

Question 8 [3.2]

The expression  simplifies to:

A  B  C  D 

Question 9 [3.4]

Rearranging the formula *A* = π*r*2 to make *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 3 marks [3.3]

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

base index reciprocal scientific notation significant figures expression

Scientists use \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to write very large or very small numbers in a convenient way. When writing index numbers, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ indicates the number of times the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is multiplied by itself.

Question 12 2 marks [3.5, 3.7]

Explain the difference between the instructions ‘factorise’ and ‘expand’. Use the expression   
4*x* + 10*xy* to help you explain.

Question 13 6 marks [3.1]

Simplify each of the following.

(a) 3*t*2 × 5*t*8

(b) 12*n*3 ÷ 4*n*

(c) 

Question 14 6 marks [3.2]

Simplify each of the following.

(a) (3*p*2)4

(b) 

(c) (2*xy*2)3 × (*x*2*y*)5

Question 15 4 marks [3.2]

Simplify each of the following, leaving your answers in index form with a single positive power.

(a) 55 × 35

(b) *v*-6

(c) *q*7 ÷ *q*11

Question 16 3 marks [3.2]

Simplify each of the following.

(a) 100

(b) 4*r*0

(c) (13*s*)0

Question 17 6 marks [3.2]

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

(a) 

(b) 

Question 18 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 7.23 × 10-3 as a number.

Question 19 1 mark [3.3]

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

Question 20 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 21 2 marks [3.4]

Rearrange the formulas below to make the variables in brackets the subject.

(a)  (*t*)

(b) *km* – *n* = *d* (*n*)

Question 22 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 23 4 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 24 4 marks [3.5]

Expand and simplify each of the following.

(a) (*q* + 7)(*q* + 2)

(b) 2(11 – *a*)(*a* + 3)

Question 25 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 area.

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

Question 26 4 marks [3.6]

Expand and simplify each of the following.

(a) (9 – *z*)2

(b) (3*n* + 4)2

Question 27 4 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 28 3 marks [3.7]

Fully factorise each of the following.

(a) 12*x* – 4

(b) 9*Lmn* – 5*mn*

(c) 7*g*2*h* – 14*gh*2

Question 29 4 marks [3.7]

Fully factorise each of the following.

(a) 4*k*2 + 12*k* – 22

(b) *t*4 + 6*t*2 – 4*t*3

Question 30 4 marks [3.7]

Fully factorise each of the following.

(a) 3(*a* – 1) + *b*(*a* – 1)

(b) 2*p*(3*w* + 2) – 3(3*w* + 2)

Question 31 2 marks [3.8]

Use the grouping in pairs technique to fully factorise 5*x* + 15 – 2*xy* – 6*y*.

Short answer results: \_\_\_ / 75

Extended answer section

Question 32 5 marks [3.3]

Consider our solar system.

(a) Mercury is 57 910 000 km from the Sun. Write this in scientific notation.

(b) Venus is 108 200 000 km from the Sun. How many significant figures does this distance contain?

(c) Mars is 2.2794 × 108 km from the Sun. Saturn is 1.433 × 109 km from the Sun. How much closer to the Sun is Mars? Express your answer in scientific notation.

(d) Earth is 149 597 890 km from the Sun. Round this to 4 significant figures, expressing your answer in scientific notation.

Question 33 6 marks [3.4, 3.5]

(a) An artist’s customised rectangular 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 piece of paper.

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

(c) Use your answer to **(b)** to 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: \_\_\_ / 96