Multiple-choice section

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Question | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Answer | A | A | C | B | B | B | C | A | C | D |

Question 1 [3.1]

A

*a* × *a*4

= *a*1 + 4

= *a*5

Question 2 [3.6]

A

(*n* + 3)2

= *n*2 + 2 × 3 × *n* + 32

= *n*2 + 6*n* + 9

Question 3 [3.5]

C

4(*p* – 1)

= 4 × *p* – 4 × 1

= 4*p* – 4

Question 4 [3.7]

B

6*d*2 – 12*d*2*c* = 6*d*2(1– 2*c*)

Question 5 [3.3]

B

All non-zero digits are significant.

End zero is not significant.

Middle zeros are significant.

Therefore, there are 4 significant figures.

Question 6 [3.8]

B

*cd* + 2*c* + 5*d* + 10

*cd* and 5*d* share the common factor of *d*.

2*c* and 10 share the common factor of 2.

*cd* + 5*d* + 2*c* + 10 = *d*(*c* + 5) + 2(*c* + 5)

Question 7 [3.1]

C

16*a*10 ÷ 4*a*2

= 

= 4*a*10 – 2

= 4*a*8

Question 8 [3.2]

A

35 × 45

= (3 × 4)5

= 125

Question 9 [3.4]

C



*q* = *pm*



Question 10 [3.2]

D

4-3 = 

Multiple-choice total marks: 10

Short answer section

Question 11 3 marks [3.2]

Any number written with a negative power can be written as 1 divided by the number raised to the positive power of the same magnitude.

Question 12 2 marks [3.5, 3.7]

‘Factorise’ and ‘expand’ are opposite instructions. To factorise is to express something as a product of its factors (often using brackets). To expand means to multiply these factors (to remove the brackets by multiplying factors inside the brackets by the factors outside).

e.g. 6*ab* + 8*a*:

The common factor is 2*a*, so place it outside of a pair of brackets and place the other factors inside:   
2*a*(3*b* + 4)

Expanding these brackets gives the original expression:   
2*a* × 3*b* + 2*a* × 4 = 6*ab* + 8*a*

Question 13 2 marks [3.1]

(a) 4*c*5 × 3*c*2 = 12*c*7

**(b)** 16*g*7 ÷ 4*g* = 4*g*6

Question 14 4 marks [3.1]

(a)  = 

(b) (*m*4)2 × (*m*7)3

= *m*8 × *m*21

= *m*29

Question 15 4 marks [3.2]

(a) (3*p*3)2

= 32*p*6

= 9*p*6

(b) 

= 

= 

Question 16 2 marks [3.2]

(a) *p*-3 = ****

(b) *c*4 ÷ *c*9

= *c*-5

= 

Question 17 3 marks [3.2]

(a) 50 = 1

(b) 5*w*0

= 5 × 1

= 5

(c) (5*w*)0 = 1

Question 18 4 marks [3.3]

(a) 4.37 × 104

(b) 43 700

(c) 4.02 × 10-2

(d) 0.042

Question 19 2 marks [3.3]



= 501.534

= 5.02 × 102

Question 20 1 mark [3.3]

(a) 4

(b) 2

Question 21 3 marks [3.4]

(a) 

*I* × *R* = *V*

*V* = *IR*

(b) *ab* – *c* = *d*

*ab* = *d* + *c*



Question 22 3 marks [3.5]

(a) 3(*p* – 2*a*) = 3*p* – 6*a*

(b) 3(*m* – 3) + 5(*m* + 2*p*)

= 3*m* – 9 + 5*m* + 10*p*

= 8*m* + 10*p* – 9

Question 23 4 marks [3.5]

|  |  |
| --- | --- |
| (a) (*a* + 4)(*a* + 5)  = *a*(*a* + 5) + 4(*a* + 5)  = *a*2 + 5*a* + 4*a* + 20  = *a*2 + 9*a* + 20 | **(b)** (*d* – 4)(*d* + 3)  = *d*(*d* + 3) – 4(*d* + 3)  = *d*2 + 3*d* – 4*d* – 12  = *d*2 – *d* – 12 |

Question 24 4 marks [3.6]

(a) (*x* + 5)2

= *x*2 + 2 × 5 × *x* + 52

= *x*2 + 10*x* + 25

**(b)** (*y* – 7)2

= *y*2 – 2 × *y* × -7+ 72

= *y*2 – 14*y* + 49

Question 25 2 marks [3.6]

(a) (*a* – *b*)(*a* + *b*) = *a*2 – *b*2

(b) (*z* – 3)(*z* + 3)

= *z*2 – 32

= *z*2 – 9

Question 26 3 marks [3.7]

(a) 24*n* – 12 = 12(2*n* – 1)

**(b)** 3*mpq* – 7*mq* = *mq*(3*p* – 7)

Question 27 2 marks [3.7]

(a) *x*(*y* – 5) + 2(*y* – 5) = (*y* – 5)(*x* + 2)

**(b)** 3*y*(2*m* + 1) – 5(2*m* + 1) = (2*m* + 1)(3*y* – 5)

Question 28 2 marks [3.8]

*xy* + 5*x* + 2*y* + 10

= *x*(*y* + 5) + 2(*y* + 5)

= (*y* + 5)(*x* + 2)

Short answer total marks: 50

Extended answer section

Question 29 5 marks [3.3]

(a) 1 424 600 000 km = 1.4246 × 109 km

(b) 778 330 000

Zeros after a non-zero digit are not significant. Therefore there are 5 significant figures.

(c) (1.082 × 108) – (5.791 × 107) km = 5.029 × 107 km

Mercury is 5.029 × 107 km closer to the Sun than Venus.

(d) 2 873 550 000 km = 2.874 × 109 km

Extended answer total marks: 5

TOTAL test marks: 65