1 (a) Simplify $h^7 \times h^2$

$x^a \times x^b = x^{a+b}$

$h^7 \times h^2 = h^{7+2}$

$= h^9$

h^9

(1)

$G = c^2 - 4c$

(b) Find the value of G when $c = -5$

$G = c^2 - 4c$

$= (-5)^2 - 4(-5)$

$= 25 - (-20)$

$= 45$

$G = 45$

(2)

(c) Solve $\frac{5x - 3}{4} = 2x + 3$

Show clear algebraic working.

$\frac{5x-3}{4} = 2x+3$ (1)

$\times 4$

$5x - 3 = 4 \times (2x+3)$

$5x - 3 = 8x + 12$

$-5x$

$-3 = 3x + 12$ (1)

-12

$-15 = 3x$

$\div 3$

$-5 = x$

$x = -5$ (1)

(3)

(Total for Question 1 is 6 marks)

2 Given that $150^x = 1$

(a) write down the value of x.

$x^0 = 1$

$x =$ 0 (1)

(1)

Given that $3^{-8} \div 3^{-6} = 3^n$

(b) find the value of n.

$\frac{3^{-8}}{3^{-6}} = 3^n$

$3^{(-8-(-6))} = 3^n$

$3^{-2} = 3^n$

$n = -2$

$a^m \times a^n = a^{m+n}$

$a^m \div a^n = a^{m-n}$

$n =$ -2 (1)

(1)

(Total for Question 2 is 2 marks)

3 (a) Simplify $k + k + k + k$

$4k$ (1)

(1)

$$f = 9 \times 9 \times 9 \times 9$$

(b) (i) Write f as a single power of 9

$9^{1+1+1+1} = 9^4$

9^4 (1)

(1)

(ii) Write f as a single power of 3

$9 = 3^2$

$f = (3^2)^4$

$= 3^{2\times4} = 3^8$

3^8 (1)

(2)

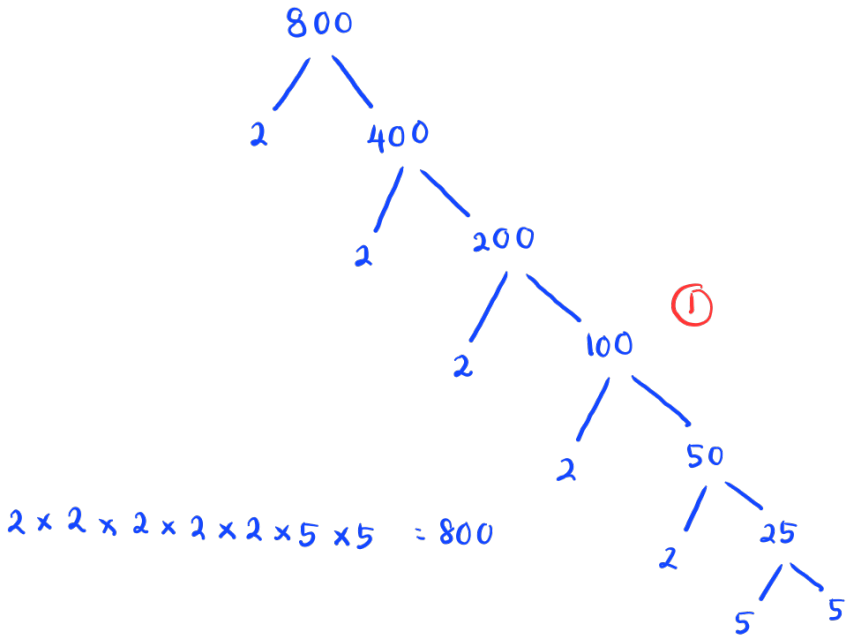
(c) Write $5^{17} \times 5^2$ as a single power of 5

$5^{17+2} = 5^{19}$

5^{19} (1)

(1)

(d) Write 800 as a product of its prime factors.
Show your working clearly.



(1)

$2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5$ (1)

(2)

(Total for Question 3 is 6 marks)

4 (c) Simplify $(p^2 + 3)^0$

$x^0 = 1$

1 (1)

.....

(1)

(Total for Question 4 is 1 marks)

5 (a) Simplify $\dfrac{x^9}{x^2}$

$x^{9-2} = x^7$

x^7 (1)

(1)

(b) Write $\dfrac{7^8 \times 7^4}{7^3}$ as a single power of 7

$\dfrac{7^{8+4}}{7^3} = \dfrac{7^{12}}{7^3}$ (1)

$= 7^{12-3}$

$= 7^9$ (1)

7^9

(2)

(Total for Question 5 is 3 marks)

6 (b) Write down the value of g^0

1

(1)

(Total for Question 6 is 1 marks)

7 (a) Write down the value of y^0

1

.....

(1)

(Total for Question 7 is 1 marks)

8 (b) Simplify a^0 where $a > 0$

1 (1)

(1)

(c) Simplify fully $\frac{3xy^3}{6x^2y}$

$\frac{3}{6} \times \frac{x}{x^2} \times \frac{y^3}{y}$

$= \frac{1}{2} \times \frac{1}{x} \times y^2$

$= \frac{y^2}{2x}$ (2)

$\frac{y^2}{2x}$

(2)

(Total for Question 8 is 3 marks)

9 (a) Simplify $8 \times (4t)^0$

8 (1)

.....

(1)

$x^6 \div x^{-5} = x^p$

(b) Find the value of p

$6 - (-5) = 11$

$p =$ 11 (1)

.....

(1)

(c) Simplify fully $(2k^2m^4)^3$

$2^3 \times k^{2\times3} \times m^{4\times3}$ (1)

$= 8k^6m^{12}$ (1)

$8k^6m^{12}$

.....

(2)

(Total for Question 9 is 4 marks)

10 (a) Simplify $x^4 \times x^5$

$x^{4+5} = x^9$

x^9 (1)

(1)

(b) Simplify $(4y^2)^3$

$4^3 \times y^{2\times3}$ (1)

$= 64y^6$ (1)

$64y^6$

(2)

(c) Factorise $n^2 - 7n + 12$

$(n-3)(n-4)$ (2)

$(n-3)(n-4)$

(2)

(Total for Question 10 is 5 marks)

11 (a) Write down the value of x^0

1 (1)

.....

(1)

Given that $2^{-3} \times 2^9 = 2^n$

(b) find the value of n

$2^{-3+9} = 2^n$

$n = 6$

$n =$ 6 (1)

.....

(1)

Given that $\dfrac{7^{206} \times 7^m}{7^{214}} = 7^{-3}$

(c) find the value of m

$206 + m - 214 = -3$ (1)

$m - 8 = -3$

$m = 5$ (1)

$m =$ 5

.....

(2)

(Total for Question 11 is 4 marks)

12 (c) Simplify $h + h + h + h + h$

5h (1)

(1)

(d) Simplify $5a + 7f - 2a + 4f$

5a - 2a + 7f + 4f

3a + 11f

3a + 11f (2)

(2)

(Total for Question 12 is 5 marks)

13 (a) Simplify $a^7 \times a^4$

$a^{7+4} = a^{11}$

a^{11} (1)

(1)

(b) Simplify $w^{15} \div w^3$

$w^{15-3} = w^{12}$

w^{12} (1)

(1)

(c) Simplify $(8x^5y^3)^2$

$8^2 \times x^{5\times2} \times y^{3\times2}$

$= 64x^{10}y^6$ (2)

$64x^{10}y^6$

(2)

(d) Make t the subject of $c = t^3 - 8v$

$t^3 = c + 8v$ (1)

$t = \sqrt[3]{c+8v}$ (1)

$t = \sqrt[3]{c+8v}$

(2)

(Total for Question 13 is 6 marks)

14 (a) Write down the value of $(m + 2)^0$ where m is a positive integer.

1

.....

(1)

(Total for Question 14 is 1 marks)

15 (a) Simplify $m^{10} \div m^3$

$m^{10-3} = m^7$ (1)

m^7

.....

(1)

$k^n \times k^4 = k^{12}$

(b) Write down the value of n

$k^{n+4} = k^{12}$

$n + 4 = 12$

$n = 8$ (1)

$n =$ 8

.....

(1)

(c) Simplify $(3x^6y^8)^2$

$3^2 \times x^{6\times2} \times y^{8\times2}$

$= 9x^{12}y^{16}$ (2)

$9x^{12}y^{16}$

.....

(2)

(Total for Question 15 is 4 marks)

16 (a) Simplify $(4^{-2})^0$

1 (1)

.....

(1)

$3^{-14} \times 3^8 = 3^m$

(b) Find the value of m

$3^{-14+8} = 3^m$

$-14+8 = m$

$-6 = m$ (1)

$m =$ -6

.....

(1)

(Total for Question 16 is 2 marks)

17 (a) Simplify $(2c^4d^7)^3$

$2^3 \times c^{4\times3} \times d^{7\times3}$

$= 8c^{12}d^{21}$

$8c^{12}d^{21}$ (2)

(2)

(b) Find the value of $5y^0$ where $y > 0$

$y^0 = 1$

$5(1) = 5$ (1)

5

(1)

(c) Factorise fully $16a^2b^3 + 20a^3b$

$4(4a^2b^3 + 5a^3b)$

$4a^2(4b^3 + 5ab)$

$4a^2b(4b^2 + 5a)$ (2)

$4a^2b(4b^2+5a)$

(2)

(d) (i) Factorise $x^2 + 9x - 22$

$(x \pm 11)(x \pm 2)$ (1)

$= (x+11)(x-2)$ (1)

$(x+11)(x-2)$

(2)

(ii) Hence solve $x^2 + 9x - 22 = 0$

$-11, 2$ (1)

(1)

(Total for Question 17 is 8 marks)