

$$1. p^3 \times p^x = p^9$$

(a) Find the value of  $x$ .

$$p^3 \times p^x = p^{3+x}$$

$$p^{3+x} = p^9$$

$$3+x=9$$

$$x=6$$

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

$$x = \underline{6} \dots\dots\dots$$

(1)

$$(7^2)^y = 7^{10}$$

(b) Find the value of  $y$ .

$$(7^2)^y = 7^{2y}$$

$$7^{2y} = 7^{10}$$

$$2y = 10$$

$$y = 5$$

$$y = \underline{5} \dots\dots\dots$$

(1)

$100^a \times 1000^b$  can be written in the form  $10^w$

(c) Show that  $w = 2a + 3b$

$$100^a \times 1000^b = 10^w$$

$$(10^2)^a \times (10^3)^b = 10^w \checkmark$$

$$10^{2a} \times 10^{3b} = 10^w$$

$$10^{2a+3b} = 10^w$$

$$2a + 3b = w \checkmark$$

(2)

2. (a) Simplify  $m^3 \times m^4$ 

Laws of indices

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

$$m^{3+4} = m^7$$

$$m^7$$

(1)

(b) Simplify  $(5np^3)^3$ 
 $(5 \times n \times p^3)^3$  - raise each individual term to the power of 3.

$$= 5^3 \times n^3 \times (p^3)^3$$

$$= 125 \times n^3 \times p^9$$

$$= 125n^3p^9$$

Laws of Indices  
 $(x^a)^b = x^{ab}$ 

$$(p^3)^3 = p^9$$

① 2 correct terms

$$125n^3p^9$$

(2)

(c) Simplify  $\frac{32q^9r^4}{4q^3r}$  =  $\frac{32 \times q^9 \times r^4}{4 \times q^3 \times r}$  =  $\frac{32}{4} \times \frac{q^9}{q^3} \times \frac{r^4}{r}$

Laws of Indices:

$$\frac{x^a}{x^b} = x^{a-b}$$

$$= 8 \times q^{9-3} \times r^{4-1}$$

$$= 8 \times q^6 \times r^3$$

① 2 correct terms

$$8q^6r^3$$

(2)

(Total for Question is 5 marks)

3. Work out the value of  $\frac{3^7 \times 3^{-2}}{3^3}$

$$\begin{aligned} & \frac{3^7 \times 3^{-2}}{3^3} \\ &= \frac{3^{7-2}}{3^3} \\ &= \frac{3^5}{3^3} \end{aligned}$$

$$\begin{aligned} &= 3^{5-3} \\ &= 3^2 \\ &= 9 \end{aligned}$$

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

$$\frac{a^x}{a^y} = a^{x-y}$$

9

(Total for Question is 2 marks)

$$v^2 = (12)^2 + 2(-3)(18)$$

$$v^2 = 144 + 2(-54)$$

$$v^2 = 144 - 108$$

$$v^2 = 36$$

$$\sqrt{\quad} \quad \sqrt{\quad}$$

$$v = \pm 6$$

$\pm 6$

$$v^2 = u^2 + 2as$$

$$(-u^2) \quad (-u^2)$$

$$v^2 - u^2 = 2as$$

$$(\div 2a) \quad (\div 2a)$$

$$\frac{v^2 - u^2}{2a} = s$$

$$s = \frac{v^2 - u^2}{2a}$$

(Total for Question is 4 marks)

4. (a) Simplify  $n^3 \times n^5$ 

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

$$\therefore n^3 \times n^5 = n^{3+5} = n^8$$

$$\frac{n^8}{(1)}$$

(b) Simplify  $\frac{c^3 d^4}{c^2 d}$ 

$$\frac{x^a}{x^b} = x^{a-b}$$

①

$$\frac{c^3 d^4}{c^2 d} = \frac{c^3}{c^2} \times \frac{d^4}{d^1} = c^{3-2} \times d^{4-1} = (c^1)(d^3) = cd^3$$

$$\frac{cd^3}{(2)}$$

(c) Solve  $\frac{5x}{2} > 7$ 

$$\begin{array}{l} \frac{5x}{2} > 7 \\ \times 2 \quad \left( \right) \quad \times 2 \\ 5x > 14 \\ \div 5 \quad \left( \right) \quad \div 5 \\ x > \frac{14}{5} \end{array}$$

①

$$\frac{x > \frac{14}{5}}{(2)}$$

(Total for Question is 5 marks)

5. (a) Simplify  $c^5 \div c^2$   $\frac{x^a}{x^b} = x^{a-b}$

$$\frac{c^5}{c^2} = c^{5-2} = c^3$$

$$\frac{c^3}{1} = c^3$$

(b) Simplify  $(d^4)^3$

$$(x^a)^b = x^{ab}$$

$$(d^4)^3 = d^{4 \times 3} = d^{12}$$

$$\frac{d^{12}}{1} = d^{12}$$