1 (a) Simplify $n^3 \times n^5$

$$n^3 \times n^5 = n^{(3+5)}$$

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

$$= n^8 \;①$$

$$\underline{\hspace{3cm} n^8 \hspace{1cm}}$$

(1)

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

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

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

$$= c d^3 \;①$$

$$\underline{\hspace{3cm} c d^3 \hspace{1cm}}$$

(2)

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

$$\frac{5x}{2} > 7$$

$$5x > 7(2)$$

$$5x > 14 \;①$$

$$x > \frac{14}{5} \;①$$

$$\underline{\hspace{3cm} x > \frac{14}{5} \hspace{1cm}}$$

(2)

(Total for Question 1 is 5 marks)

2 Work out the value of $\dfrac{\left(5\frac{4}{9}\right)^{-\frac{1}{2}} \times \left(4\frac{2}{3}\right)}{2^{-3}}$
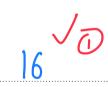
You must show all your working.

simplify fractions first

$$\dfrac{\left(\dfrac{49}{9}\right)^{-1/2} \times \dfrac{14}{3}}{2^{-3}}$$

a — power flips the fraction

✓ ①

$$\left(\dfrac{3}{7} \times \dfrac{14}{3}\right) \div \dfrac{1}{8}$$ ✓ ①

$$\dfrac{3 \times 14}{7 \times 3} \times 8$$ ✓ ①

3's cancel   left with 2×8
7's cancel $= 16$

16 ✓ ①

(Total for Question 2 is 4 marks)

3 (a) Simplify $(x^3)^5$

$$(x^3)^5 = x^{3 \times 5} = x^{15}$$

brackets so indices multiply

x^{15} ①

....

(1)

(b) Expand and simplify $4(x + 3) + 7(4 - 2x)$

$4(x+3) + 7(4-2x)$ ⎤ expand brackets

① $4x + 12 + 28 - 14x$ ⎤ collect like

$40 - 10x$ ⎦ terms

$40 - 10x$ ①

....

(2)

(c) Factorise fully $15x^3 + 3x^2y$

find factors common to both terms: both terms have $3x^2$.

① $3x^2(5x + y)$

∴ take out factor of $3x^2$

$3x^2(5x+y)$ ①

....

(2)

(Total for Question 3 is 5 marks)

4 (a) Express $\sqrt{\dfrac{10^{360}}{10^{150} \times 10^{90}}}$ as a power of 10

$$\sqrt{\frac{10^{360}}{10^{150} \times 10^{90}}} = \frac{\left(10^{360}\right)^{1/2}}{\left(10^{150} \times 10^{90}\right)^{1/2}}$$

remember $\sqrt{\dfrac{a}{b}} = \dfrac{\sqrt{a}}{\sqrt{b}}$

and $\sqrt{a} = a^{1/2}$

$$= \frac{10^{360 \times \frac{1}{2}}}{\left(10^{150+90}\right)^{1/2}} \quad ①$$

$$= \frac{10^{180}}{\left(10^{240}\right)^{1/2}}$$

$$= \frac{10^{180}}{10^{120}} ① = 10^{60}$$

10^{60} ①

*5+

Liam was asked to express $(12^{50})^2$ as a power of 12

Liam wrote $(12^{50})^2 = 12^{50^2} = 12^{2500}$

Liam's method is wrong.

(b) Explain why.

because $\left(a^b\right)^c = a^{bc}$ NOT a^{b^c} ①

so $\left(12^{50}\right)^2 = 12^{100}$

*3+

*Vqvcrlhqt 'S wguvkqp '4 'ku '6 'b ctm++

5 Simplify $(2^{-5} \times 2^8)^2$

Give your answer as a power of 2

$$(2^{-5} \times 2^8)^2$$

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

$$= (2^{-5+8})^2$$

①

$$= (2^3)^2$$

$$(a^b)^c = a^{bc}$$

$$= 2^6$$

①

$$2^6$$

(Total for Question 5 is 2 marks)

6 Work out the value of $\left(\dfrac{8}{27}\right)^{\frac{4}{3}}$

$$\left(\frac{8}{27}\right)^{4/3} = \left(\frac{8^{1/3}}{27^{1/3}}\right)^4 = \left(\frac{2}{3}\right)^4 = \frac{16}{81}$$

$$\frac{16}{81}$$

(Total for Question 6 is 2 marks)

7 (a) Simplify fully $(3x^5y^6)^4$

$$(3x^5y^6)^4 = 3^4 x^{20} y^{24} = 81x^{20}y^{24} \quad ②$$

Indices distribute
to terms multiplied together

$$\underline{81x^{20}y^{24}}$$

(2)

(b) Expand and simplify $(x + 2)(x - 3)(x + 4)$

consider
$$(x-3)(x+4)$$
$$= x^2 + 4x - 3x - 12$$
$$= x^2 + x - 12 \quad ①$$

$$(x+2)(x^2+x-12)$$
$$= x^3 + 2x^2 + x^2 + 2x - 12x - 24 \quad ①$$
$$= x^3 + 3x^2 - 10x - 24$$

①

$$\underline{x^3 + 3x^2 - 10x - 24}$$

(3)

(Total for Question 7 is 5 marks)