1 (a) Expand and simplify $(x + 5)(x - 9)$

$x^2 - 9x + 5x - 45$

$= x^2 - 4x - 45$

$x^2 - 4x - 45$

(2)

(b) Factorise fully $9x^2 + 6x$

$3x(3x + 2)$

(2)

(Total for Question 1 is 4 marks)

2 Expand and simplify $5(p + 3) - 2(1 - 2p)$

$5p + 15 - 2 + 4p$

$= 9p + 13$

$9p + 13$

(Total for Question 2 is 2 marks)

2 Expand and simplify $(m + 7)(m + 3)$

$m^2 + 3m + 7m + 21$

$= m^2 + 10m + 21$

.....

(Total for Question 2 is 2 marks)

3 (a) Expand and simplify $3(y - 2) + 5(2y + 1)$

$3y - 6 + 10y + 5$

$= 13y - 1$

$13y - 1$

(2)

(b) Simplify $5u^2w^4 \times 7uw^3$

$35u^3w^7$

(2)

(Total for Question 3 is 4 marks)

9 (a) Expand and simplify $(x - 2)(2x + 3)(x + 1)$

$2x^2 + 3x - 4x - 6$

$= 2x^2 - x - 6$

$(2x^2 - x - 6)(x + 1)$

$= 2x^3 + 2x^2 - x^2 - x - 6x - 6$

$= 2x^3 + x^2 - 7x - 6$

Tip: First multiply out the first two brackets as normal

Tip: Multiply the $2x^2$ by everthing in the second bracket, then repeat for the -x, and then for the -6

$2x^3 + x^2 - 7x - 6$

(3)

$$\frac{y^4 \times y^n}{y^2} = y^{-3}$$

(b) Find the value of n.

$4 + n - 2 = -3$

$2 + n = -3$

$-2 \quad -2$

$n = -5$

-5

(2)

(c) Solve $5x^2 - 4x - 3 = 0$

Give your solutions correct to 3 significant figures.

Tip: Because you have been told to give your answer to 3 significant figures, you will need to use the Quadratic Formula

$a = 5$

$b = -4$

$c = -3$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-(-4) \pm \sqrt{(-4)^2 - 4(5)(-3)}}{2(5)}$$

$x = 1.27$ or -0.472

(3)

(Total for Question 9 is 8 marks)

10 Show that $(x + 1)(x + 2)(x + 3)$ can be written in the form $ax^3 + bx^2 + cx + d$ where a, b, c and d are positive integers.

$x^2 + 2x + x + 2$

$= (x^2 + 3x + 2)(x + 3)$

$= x^3 + 3x^2 + 3x^2 + 9x + 2x + 6$

$= x^3 + 6x^2 + 11x + 6$

(Total for Question 10 is 3 marks)

12 (a) Express $\frac{x}{x+2} + \frac{2x}{x-4}$ as a single fraction in its simplest form.

Tip: To add fractions the denominators must be the same

$$\frac{x(x-4)}{(x+2)(x-4)} + \frac{2x(x+2)}{(x+2)(x-4)}$$

$$\frac{x(x-4) + 2x(x+2)}{(x+2)(x-4)} = \frac{x^2 - 4x + 2x^2 + 4x}{(x+2)(x-4)}$$

$$= \frac{3x^2}{(x-2)(x-4)}$$

$$\frac{3x^2}{(x-2)(x-4)}$$

(3)

(b) Expand and simplify $(x - 3)(2x + 3)(4x + 5)$

Tip: First multiply out the first two brackets as normal

$$= 2x^2 + 3x - 6x - 9$$

$$= 2x^2 - 3x - 9$$

Tip: Multiply the $2x^2$ by everthing in the second bracket, then repeat for the $-3x$, and then for the -9

$$(2x^2 - 3x - 9)(4x + 5)$$

$$= 8x^3 + 10x^2 - 12x^2 - 15x - 36x - 45$$

$$= 8x^3 - 2x^2 - 51x - 45$$

$8x^3 - 2x^2 - 51x - 45$

(3)

(Total for Question 12 is 6 marks)

12 Expand and simplify $(x - 2)(3x + 2)(2x + 3)$

$(x-2)(3x+2)$

$3x^2 + 2x - 6x - 4$

$= (3x^2 - 4x - 4)(2x + 3)$

$= 6x^3 + 9x^2 - 8x^2 - 12x - 8x - 12$

$= 6x^3 + x^2 - 20x - 12$

$6x^3 + x^2 - 20x - 12$

(Total for Question 12 is 3 marks)

13 Show that

$$(3x - 1)(x + 5)(4x - 3) = 12x^3 + 47x^2 - 62x + 15$$

for all values of x.

Tip: Just work out the answer

$3x^2 + 15x - x - 5$

$= 3x^2 + 14x - 5$

$(3x^2 + 14x - 5)(4x - 3)$

$= 12x^3 - 9x^2 + 56x - 42x - 20x + 15$

$= 12x^3 + 47x^2 - 62x + 15$

(Total of Question 13 is 3 marks)

15 Expand and simplify $(3x + 2)(2x + 1)(x - 5)$

$6x^2 + 3x + 4x + 2$

$= (6x^2 + 7x + 2)(x - 5)$

$= 6x^3 - 30x^2 + 7x^2 - 35x + 2x - 10$

$= 6x^3 - 23x^2 - 33x - 10$

$6x^3 - 23x - 33x - 10$

(Total for Question 15 is 3 marks)

18 (a) Show that $(2x + 1)(x + 3)(3x + 7)$ can be written in the form $ax^3 + bx^2 + cx + d$ where a, b, c and d are integers.

$2x^2 + 6x + x + 3$

$= (2x^2 + 7x + 3)(3x + 7)$

$= 6x^3 + 14x^2 + 21x^2 + 49x + 9x + 21$

$= 6x^3 + 35x^2 + 58x + 21$

(3)

(b) Solve $(1 - x)^2 < \frac{9}{25}$

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

$1 - x = \pm \frac{3}{5}$

Tip: This is a quadratic equation, when you square root you need to consider the positive and negative square root.

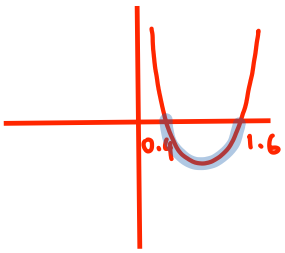
$1 - x = \frac{3}{5}$ OR $1 - x = -\frac{3}{5}$

$+x \quad +x$

$1 = \frac{3}{5} + x$ $1 = -\frac{3}{5} + x$

$-\frac{3}{5} \quad -\frac{3}{5}$ $+\frac{3}{5} \quad +\frac{3}{5}$

$0.4 = x$ $1.6 = x$



$0.4 < x < 1.6$

(3)

(Total for Question 18 is 6 marks)

1 (a) Expand and simplify $(x + 5)(x - 9)$

$x^2 - 9x + 5x - 45$

$= x^2 - 4x - 45$

$x^2 - 4x - 45$

(2)

(b) Factorise fully $9x^2 + 6x$

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2 Expand and simplify $5(p + 3) - 2(1 - 2p)$

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3 (a) Expand and simplify $3(y - 2) + 5(2y + 1)$

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$13y - 1$

(2)

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$35u^3w^7$

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9 (a) Expand and simplify $(x - 2)(2x + 3)(x + 1)$

$2x^2 + 3x - 4x - 6$

$= 2x^2 - x - 6$

$(2x^2 - x - 6)(x + 1)$

$= 2x^3 + 2x^2 - x^2 - x - 6x - 6$

$= 2x^3 + x^2 - 7x - 6$

Tip: First multiply out the first two brackets as normal

Tip: Multiply the $2x^2$ by everthing in the second bracket, then repeat for the -x, and then for the -6

$2x^3 + x^2 - 7x - 6$

(3)

$$\frac{y^4 \times y^n}{y^2} = y^{-3}$$

(b) Find the value of n.

$4 + n - 2 = -3$

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(2)

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$$= \frac{3x^2}{(x-2)(x-4)}$$

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$$= 2x^2 + 3x - 6x - 9$$

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$8x^3 - 2x^2 - 51x - 45$

(3)

(Total for Question 12 is 6 marks)

12 Expand and simplify $(x - 2)(3x + 2)(2x + 3)$

$(x-2)(3x+2)$

$3x^2 + 2x - 6x - 4$

$= (3x^2 - 4x - 4)(2x + 3)$

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(Total for Question 15 is 3 marks)

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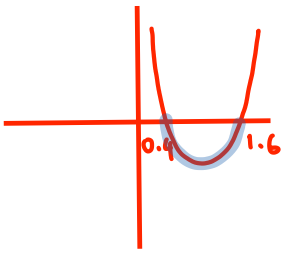
$-\frac{3}{5} \quad -\frac{3}{5}$ $+\frac{3}{5} \quad +\frac{3}{5}$

$0.4 = x$ $1.6 = x$



$0.4 < x < 1.6$

(3)

(Total for Question 18 is 6 marks)