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LOCATION: SWANSEA

LLEOLIAD: ABERTAWE

LEVEL 3

LEFEL 3

EXAMINATION PERIOD
JANUARY 2018

MODULE CODE: M3X01512
MATHEMATICS

TIME: 1 ½ HOURS

ANSWER ALL QUESTIONS

Equipment or materials required –

Calculators allowed

Formula booklet provided

Show all workings

1. Using examples of your own, write down each of the following

- (i) Improper fraction
 - (ii) Mixed fraction
 - (iii) Proper fraction
- (3)

2. Calculate the following, **showing all your workings**, and giving your answers as mixed fractions in their simplest form:

(i) $3\frac{1}{3} + 5\frac{1}{2}$

(ii) $4\frac{2}{3} \times 2\frac{1}{4}$

(6)

3. Express 0.1457895 to 3 decimal places and 4 significant figures.

(2)

4. Express the following numbers in standard form :

(i) 12564 (ii) 0.00023

(2)

5. Solve the following quadratic equations by the factorisation method :

(i) $x^2 + 11x + 30 = 0$

(ii) $x^2 - 25 = 0$

(iii) $2x^2 = -5x - 3$

(11)

6. Use the formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ to find the two solutions of the following quadratic equation, **giving your answers correct to one decimal place.** $8x^2 + 3x - 4 = 0$

(7)

7. Solve the following simultaneous equations:

$$\begin{aligned}2x + 3y &= 3 \\ 5x + 2y &= 13\end{aligned}$$

(5)

8. Transpose the following to make x the subject of the formula:

$$w = \frac{y + xt}{x + 1}$$

(5)

9. Express the following in partial fractions:

$$\frac{5x + 11}{(x + 3)(x + 2)}$$

(5)

10. Simplify the following as far as possible:

(i) $x^5 \times x^2$

(ii) $(3u)^2$

(iii) $\sqrt[5]{x^3 \times x}$

(5)

11. Solve the following equations using the laws of logarithms:

(i) $5^{x+1} = 3^x$

(ii) $2 \log(x + 3) = \log(x + 2) + \log(x + 5)$

(8)

12. Solve the following linear equations:

(i) $2(x + 3) = 5(x + 1)$

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

(8)

TOTAL MARKS: 67

1) (i) $\frac{7}{2}$ (ii) $3\frac{1}{2}$ (iii) $\frac{1}{2}$

1 1 1
3

2) (i) $3\frac{1}{3} + 5\frac{1}{2} = \frac{10}{3} + \frac{11}{2}$

$$= \frac{20 + 33}{6}$$

$$= \frac{53}{6} = 8\frac{5}{6}$$

1
1
1

(ii) $4\frac{2}{3} \times 2\frac{1}{4} = \frac{14}{3} \times \frac{9}{2}$

$$= \frac{42}{1} = 21 = 10\frac{1}{2}$$

1 1
1

8

3) 0.1457895

3dp : 0.146

4sf : 0.1458

1
1

2

$$5) \quad (i) \quad x^2 + 11x + 30 = 0$$

$$(x+5)(x+6) = 0$$

$$x+5=0 \quad x+6=0$$

$$x = -5 \quad x = -6$$

$$(ii) \quad x^2 - 25 = 0$$

$$(x+5)(x-5) = 0$$

$$x = \pm 5$$

$$(iii) \quad 2x^2 = -5x - 3$$

$$2x^2 + 5x + 3 = 0$$

$$(2x+3)(x+1) = 0$$

$$2x+3=0 \quad x+1=0$$

$$2x = -3 \quad x = -1$$

$$x = -3/2$$

(11)

6)

$$x = \frac{-3 \pm \sqrt{(3)^2 - 4(8)(-4)}}{2(8)}$$

$$x = \frac{-3 \pm \sqrt{9 + 128}}{16}$$

$$x = \frac{-3 \pm \sqrt{137}}{16}$$

$$x = \frac{-3 \pm 11.70}{16}$$

$$x = \frac{-3 + 11.70}{16}$$

$$x = \frac{-3 - 11.70}{16}$$

$$x = 0.54$$

$$x = 0.5$$

to 1 dp

$$x = -0.91$$

$$x = -0.9$$

to 1 dp

⑦

7)

$$2x + 3y = 3 \quad (1) \times 2$$

$$5x + 2y = 13 \quad (2) \times 3$$

$$4x + 6y = 6 \quad (3)$$

$$15x + 6y = 39 \quad (4)$$

(4) - (3)

$$11x = 33$$

$$x = 3 \rightarrow \text{in } (1)$$

$$6 + 3y = 3$$

$$3y = -3$$

$$y = -1$$

(5)

8)

$$w = \frac{y + xt}{x+1}$$

[x]

$$w(x+1) = y + xt$$

$$wx + w = y + xt$$

$$w - y = xt - wx$$

$$w - y = x(t - w)$$

$$\frac{w - y}{t - w} = x$$

(5)

$$9) \quad \frac{5x+11}{(x+3)(x+2)} = \frac{A}{(x+3)} + \frac{B}{(x+2)}$$

$$5x+11 = A(x+2) + B(x+3)$$

$$x = -2$$

$$-10+11 = B$$

$$1 = B$$

$$x = -3$$

$$-15+11 = -A$$

$$-4 = -A$$

$$4 = A$$

$\therefore$ Pfs are

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

$$10) \quad (i) \quad x^5 \times x^2 = x^7$$

$$(ii) \quad (3u)^2 = 9u^2$$

$$(iii) \quad \sqrt[5]{x^3 \times x}$$

$$= \sqrt[5]{x^4}$$

$$= x^{4/5}$$

for $q \rightarrow$
for u^2

(5)

(5)

11)

$$(i) 5^{x+1} = 3^x$$

$$\log 5^{x+1} = \log 3^x$$

$$(x+1)\log 5 = x\log 3$$

$$(x+1)0.70 = 0.48x$$

$$0.7x + 0.7 = 0.48x$$

$$0.7x - 0.48x = -0.7$$

$$0.22x = -0.7$$

$$x = 3.18$$

④

$$(ii) 2\log(x+3) = \log(x+2) + \log(x+5)$$

$$\log(x+3)^2 = \log(x+2)(x+5)$$

$$(x+3)(x+3) = (x+2)(x+5)$$

$$x^2 + 6x + 9 = x^2 + 7x + 10$$

$$9 - 10 = 7x - 6x$$

$$-1 = x$$

④

12)

$$(i) \quad 2(x+3) = 5(x+1)$$

$$2x+6 = 5x+5$$

$$6-5 = 5x-2x$$

$$1 = 3x$$

$$\frac{1}{3} = x$$

$$(ii) \quad \frac{(2x+1)}{5} = \frac{(3x+2)}{2}$$

$$2(2x+1) = 5(3x+2)$$

$$4x+2 = 15x+10$$

$$2-10 = 15x-4x$$

$$-8 = 11x$$

$$\frac{-8}{11} = x$$

i.e. -0.73

8

Total 67 marks

