

LOCATION: SWANSEA

LLEOLIAD: ABERTAWE

LEVEL 3

LEFEL 3

EXAMINATION PERIOD
DECEMBER 2017

MODULE CODE: M3X01512
MATHEMATICS (MOCK)

TIME: 1 ½ HOURS

ANSWER ALL QUESTIONS

Equipment or materials required –

Calculators allowed

Formula booklet provided

Show all workings

1. Give an example of the following:

(i) Improper fraction

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

(i) $8\frac{1}{2} - 2\frac{1}{3}$

(ii) $\frac{42}{3} \div \frac{2}{5}$

3. Express 1.451234 to 2 decimal places and 4 significant figures.

4. Express the following number in standard form :

(i) 451200

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

(i) $x^2 + 7x + 10 = 0$

(ii) $2x^2 + 9x + 4 = 0$

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.** $12x^2 + 4x - 9 = 0$

7. Solve the following simultaneous equations:

$$4x + y = 13$$

$$5x + 3y = 18$$

8. Solve the following linear equations:

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

(ii) $\frac{(6x+4)}{3} = 7x - 12$

9. Express the following in partial fractions:

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

10. Simplify the following as far as possible:

(i) $x^6 \times x^3 \times x^2 \times x$

(ii) $(3x)^3$

(iii) $\sqrt{x^2}$

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

(i) $\log(x + 1) + \log(x + 2) = \log(x + 3) + \log(x + 4)$

(ii) $5^x = 9$

1) $\frac{5}{3}$

2) (i) $8\frac{1}{2} - 2\frac{1}{3}$

$$= \frac{17}{2} - \frac{7}{3} = \frac{(3 \times 17) - (2 \times 7)}{6}$$

$$= \frac{51 - 14}{6} = \frac{37}{6} = 6\frac{1}{6}$$

(ii) $\frac{42}{3} \div \frac{2}{5}$

$$= \frac{42}{3} \times \frac{5}{2} = \frac{210}{6} = 35$$

3) 1.451234

2 dp = 1.45

4 sf = 1.451

4) 4.512×10^5

5)

$$x^2 + 7x + 10 = 0$$

(i) $(x+5)(x+2) = 0$

$$x+5=0 \quad x+2=0$$

$$x = -5$$

$$x = -2$$

(ii) $2x^2 + 9x + 4 = 0$

$$(2x+1)(x+4) = 0$$

$$2x+1=0 \quad x+4=0$$

$$x = -\frac{1}{2}$$

$$x = -4$$

6)

$$12x^2 + 4x - 9 = 0$$

$\uparrow$ $\uparrow$ $\uparrow$
 a b c

$$x = \frac{-4 \pm \sqrt{(4)^2 - 4(12)(-9)}}{2(12)}$$

$$= \frac{-4 \pm \sqrt{16 + 432}}{24}$$

$$= \frac{-4 \pm \sqrt{448}}{24}$$

$$= \frac{-4 \pm 21.17}{24}$$

$$x = \frac{-4 + 21.17}{24} = 0.72$$

$$x = \frac{-4 - 21.17}{24} = -1.05$$

$$7) \quad 4x + y = 13 \quad (1) \times 3$$

$$5x + 3y = 18 \quad (2)$$

$$12x + 3y = 39 \quad (3)$$

$$(3) - (2)$$

$$7x = 21$$

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

$$12 + y = 13$$

$$(y = 1)$$

$$8) \quad (i) \quad 5(2x + 5) = 5(x - 3)$$

$$10x + 25 = 5x - 15$$

$$10x - 5x = -15 - 25$$

$$5x = -40$$

$$x = \frac{-40}{5} = -8$$

$$(ii) \quad \frac{(6x + 4)}{3} = 7x - 12$$

$$6x + 4 = 3(7x - 12)$$

$$6x + 4 = 21x - 36$$

$$4 + 36 = 21x - 6x$$

$$40 = 15x$$

$$(2.67 = x)$$

$$9) \frac{5x+1}{(x+1)(x-2)} = \frac{A}{(x+1)} + \frac{B}{(x-2)}$$

$$5x+1 = A(x-2) + B(x+1)$$

$$\underline{x=2}$$

~~10~~ ~~10~~

$$9 = 3B$$

$$\boxed{3=B}$$

$$\underline{x=-1}$$

$$-6 = -3A$$

$$\boxed{2=A}$$

$$\therefore \text{PFs are: } \frac{2}{(x+1)} + \frac{3}{(x-2)}$$

10)

(i) x^{12}

(ii) $27x^3$

(iii) x^1

$$11) (i) \log(x+1) + \log(x+2) = \log(x+3) + \log(x+4)$$

$$\log(x+1)(x+2) = \log(x+3)(x+4)$$

$$x^2 + 3x + 2 = x^2 + 7x + 12$$

$$-10 = 4x$$

$$\boxed{\frac{-10}{4} = x}$$

$$\text{i.e. } \underline{-2.5}$$

(ii) $5^x = 9$

$$\log 5^x = \log 9$$

$$x \log 5 = \log 9$$

$$0.70x = 0.95$$

$$x = \frac{0.95}{0.70}$$

$$\boxed{x = 1.36}$$