Question 1 Percentages, Fractions, Order of Operations, Rounding, Standard forms.

a) Find

i. $42\frac{1}{2}\%$ as a decimal

ii. $42\frac{1}{2}\%$ as a fraction in simplest form

iii. $42\frac{1}{2}\%$ of 600

[3]

b) Round the following numbers

i. 0.0041993 to 3 significant figures

ii. 23.4598 to 3 decimal places

[2]

c) Subtract 4.2×10^{-1} from $2.4 \times 10^{2}$and give your answer in standard form. You must show your working

[2]

d) Insert brackets to make the following equation true

$$6 - 4^2 + 2 \times 5 = 30$$

[1]

e) A number is 1550 correct to 3 significant figures. Find

i. The smallest possible number

ii. The largest possible number

[2]

Question 2 Algebraic expressions, Substitution and Ratio

a) Expand and simplify the following

i. $(x - y) - 8(x + y)$

ii. $(x - y)^2 - 8(x + y)$

iii. Evaluate the expression $(x-y)^3(x-2y)$ when $x=2$ and $y=-1$

[3]

b) Simplify the following expressions, giving answers in their simplest form

i. $\frac{(4x+5)(x+3)}{(x+3)(x+5)}$

ii. $\frac{x^2+5x+6}{x^2-4x-12}$

[3]

c) Simplify the following expressions

i. $\frac{4x}{3} \div \frac{2}{9}$

ii. $(a^2b^5) \times (a^{-3}b^{-2}c)$

[2]

d) Two brothers, Mike and Vince, share a sum of money in the ratio 3: 8. Vince gets £40 more than Mike. Calculate how much the brothers share. You must show your working.

[2]

Question 3 Factors and Multiples

a) Express the numbers 120, 150 and 360 as a product of primes and find their lowest common multiple.

[2]

Question 4 Linear, Simultaneous and Quadratic Equations

a) Solve the following equations. You must show full working.

i. $4x-6=-5x+2$

ii. $3(2x-8)=-5(2x+8)$

[2]

b) Solve the following simultaneous equations

$$4x-3y=11$$
$$10x+2y=-1$$

[2]

c) Factorise the following quadratic expressions.

i. $x^2 - 6x + 9$

ii. $4x^2 + 3x$

iii. $4x^2 - 5x - 6$

[3]

d) Hence or otherwise, solve the following quadratic equations

i. $x^2 - 6x + 9 = 0$

ii. $4x^2 + 3x = 0$

iii. $4x^2 - 5x - 6 = 0$

[3]

Question 5 Indices

a) Given that $2^3 = 8$, express 8^{2x+4} in the form 2^y where y is an expression in terms of x.

[1]

b)

i. Evaluate $9^2 \div 9^5$

ii. Evaluate $125^{-\frac{2}{3}}$

iii. Given that $27\sqrt{3} = 3^a$, find the value of a.

iv. Simplify $(16x^{12})^{\frac{3}{4}}$

[4]