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Question 1 (1.a = 13 marks; 1.b = 12 marks)

1.a

A greengrocer bought 200 kg of potatoes at E27 per 100 kg and 300 kg of potatoes at E22 per 100kg. He sold them all for a price of 5kg for E1.5. Calculate the total price profit he made on the potatoes. Find also the price per 5 kg at which he should have sold these potatoes to make a profit of 75% of his total outlay.

1.b

A certain mixture of fertilizer and water contains 35% of fertilizer by weight. To every 100 grammes of the mixture are added 25 grammes of water. Find what percentage of the weight of the diluted mixture is fertiliser.

Question 2 (2.a = 10 marks; 2.b.1=5 marks; 2.b.2=5 marks; 2.b.c=5 marks)

2.a

Plot the graph of $y = x^2 + 8x - 2$ taking values of x between -12 and 2 . On the same axes, and to the same scale, plot the graph of $y = 2x - 1$. Hence find the values of x which satisfy the equation $x^2 + 8x - 2 = 2x - 1$.

2.b

(2..b.1) A farm owner bought for his tractor a certain number of litres of petrol for E156. If petrol costs x cents per litre write down an expression for the number of litres of petrol he received.

(2.b.2) When the price per litre was increased by 0.01 he found that he received 100 litres fewer for the same sum of money. Form an equation for x and show it reduces to $x^2 + x - 156 = 0$.

(2.b.3) Calculate the original price of the petrol per litre.

Question 3 (3.a=10 marks; 3.b=10 marks; 3.c=5 marks)

3.a

Find the range of the functions

$$F(q) = \sqrt{2q + 1} \quad ; \quad F(q) = \frac{2q + 1}{q^2 - q - 2}$$

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3.b

Find the limit of the function $f(x)$ when $x \rightarrow -1$

$$f(x) = \frac{x+1}{x^2 - x - 2}$$

3.c

Find the first derivative of the function $f(t) = (2t + 5)^5$

Question 4 (4.a=15 marks ; 4.b = 10 marks)

4.a

The total costs (TC) for producing a variety of crop at an output q algebraically represented by the function $f(q)$ as:

$$TC = f(q) = 2q^3 + 0.2q^2 - 19.3q + 15.75$$

Find the values of q for which a maximum or a minimum, respectively, is reached for TC.

4.b

Evaluate the integral (area) for x -values ranging from $x = 1$ to $x = 4$

$$\int \frac{4x + 1}{2x^2 + x - 4} dx$$

Question 5 (5.a = 12.5 marks; 5.b= 12.5 marks)

5.a

A measuring jar is in the form of a vertical cylinder which is graduated so that the volume of liquid in the jar can be read directly in cubic centimetres. The internal radius of the jar is 2.4 cm. Find to the nearest millimetre the distance between the two marks labelled 200 cm³ and 300 cm³. When the jar is partly full of water, a steel sphere of radius 1.8 cm is lowered into the jar and completely immersed in the water without causing the water to overflow. Find in millimetres the distance the water-level rises in the jar.

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5.b

A rectangular block of lead is 40 cm long, 35 cm wide and 25 cm high. The metal is to be used in the manufacture of lead pipe of internal diameter 5 cm and external diameter 10 cm. Calculate in metres, the length of pipe manufactured. If water is to be pumped through the pipe at a rate of 15000 litres per minute calculate, in m/s, the speed of water flowing through the pipe.

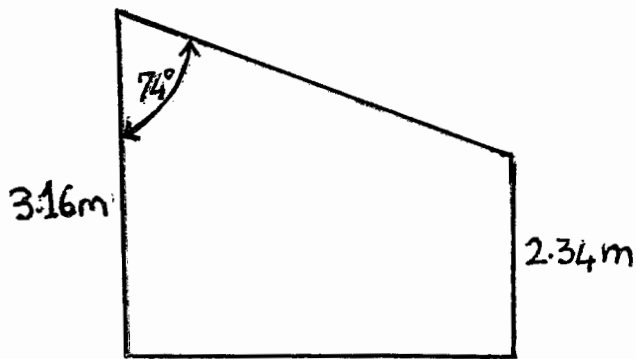
Question 6 (6.a=13 marks; 6.b= 6 marks; 6.c = 6 marks)

6.a

The equal sides of an isosceles triangle are each 27 cm long and the altitude is 19 cm. Find the angle of the triangle.

6.b

Calculate the distance x in figure 6.b.f below



6.c

calculate the distance d in figure 6.c f below

