



Maths Points

Junior and Leaving Cert

LCOL BASIC SKILLS PACK 10

LEAVING CERT ORDINARY LEVEL



Topic, Year and Level

- 1 ► Differentiation : 2012 Paper 1 – Q9 (a)
- 2 ► Complex Numbers : 2013 Sample Paper 1 – Q3 (a)
- 3 ► Functions : 2013 Sample Paper 1 – Q7 (a)
- 4 ► Statistics : 2019 Paper 2 – Q7 (c) (ii)
- 5 ► Geometry : 2014 LCOL Sample Paper 2 – Q6 (b)



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Investments can increase or decrease in value. The value of a particular investment of €100 was found to fit the following model:

$$V = 100 + 45t - 1.5t^2$$

where V is the value of the investment in euro, and t is the time in months after the investment was made.

Find the rate at which the value of the investment was changing after 6 months.

Differentiate the function to find the rate of change.

$$V = 100 + 45t - 1.5t^2$$

$$\frac{dV}{dt} = 45 - 3t$$

← Rate of change

$$= 45 - 3(6)$$

← $t = 6$

$$= 45 - 18$$

$$= 27$$

The rate at which the value of the investment was changing after 6 months was €27 per month.



State whether the value of the investment was increasing or decreasing after 18 months.
Justify your answer.

$$V = 100 + 45t - 1.5t^2$$

$$\frac{dV}{dt} = 45 - 3t$$

$$\frac{dV}{dt} = 45 - 3t$$

← Rate of
change

$$= 45 - 3(18)$$

← $t = 18$

$$= 45 - 54$$

$$= -9$$

The rate of change is negative after 18 months therefore the value of the investment is decreasing at this time.



The investment was cashed in at the end of 24 months.
How much was it worth at that time?

To find the value of the investment after 24 months sub $t = 24$ into the value, V , function.

$$V = 100 + 45t - 1.5t^2$$

$$V = 100 + 45t - 1.5t^2$$

$$V = 100 + 45(24) - 1.5(24)^2$$

← $t = 24$

$$V = \text{€}316$$

The investment is worth €316 after 24 months.

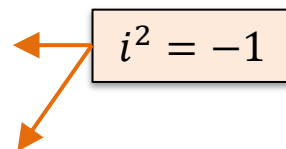


Write each of the following complex numbers in the form $a + bi$, where $i^2 = -1$.

$$z_4 = 1 + i + i^2 + i^3$$

$$z_4 = 1 + i + i^2 + i^3$$

$$z_4 = 1 + i + (-1) + i(i^2)$$

$$i^2 = -1$$


$$z_4 = 1 + i - 1 + i(-1)$$

$$z_4 = 1 + i - 1 - i$$

$$z_4 = 0 + 0i$$

Let $h(x) = x^2 + 1$, where $x \in \mathbb{R}$.

Write down a value of x for which $h(x) = 50$.

Let the function $h(x)$ equal 50 and solve for x .

$$h(x) = x^2 + 1$$

$$h(x) = 50$$

$$x^2 + 1 = 50$$

$$x^2 = 50 - 1$$

$$x^2 = 49$$

$$x = \pm\sqrt{49}$$

$$x = \pm 7$$

Use your calculator to find the standard deviation for the data in the **Meat** category.

Give your answer correct to the nearest whole number.

$$\sigma = 50.99$$

$$\sigma \approx \text{€}51$$



Standard deviation is a **measure of how spread out** or how close together a group of numbers is.

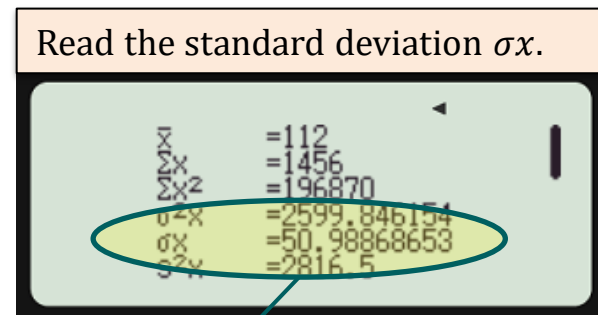
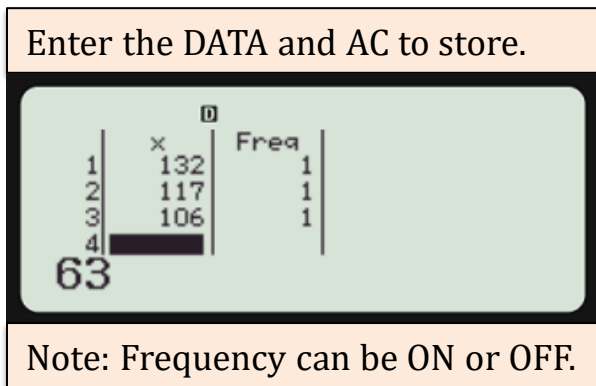
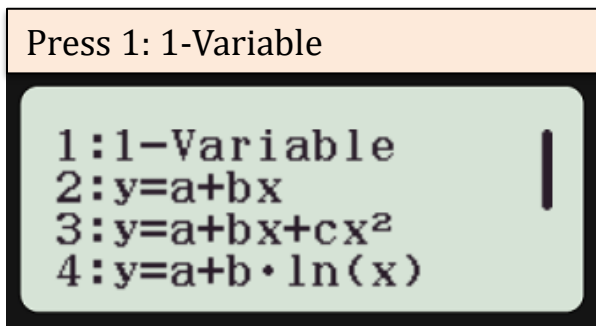
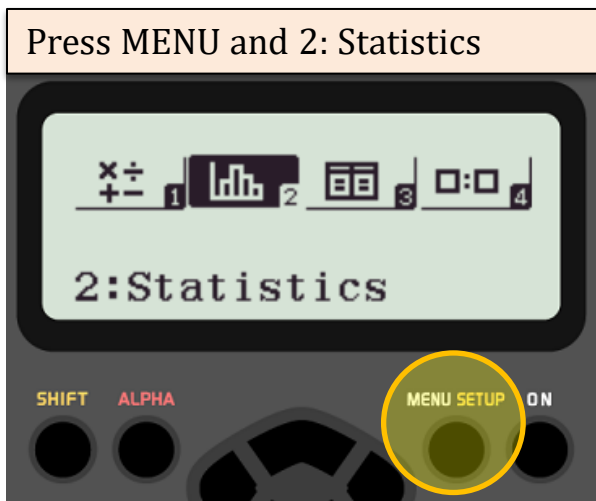
With a mean of €112 and a standard deviation of €51 the data has a relatively large spread and is not tightly clustered around the mean.

Table A (€) (Repeat)

Country	Meat	Fish	Milk, Cheese and Eggs	Fruits, Vegetables and Potatoes
Austria	132	125	105	125
Germany	117	109	91	111
Ireland	106	108	128	136
Lithuania	63	73	85	77
Macedonia	56	59	71	48
Netherlands	111	99	93	104
Norway	157	117	175	150
Poland	54	64	65	62
Spain	85	89	96	95
Sweden	131	115	116	137
Switzerland	254	177	148	172
Turkey	78	105	122	86
United Kingdom	112	105	118	116

Calculator Work

Meat
132
117
106
63
56
111
157
54
85
131
254
78
112



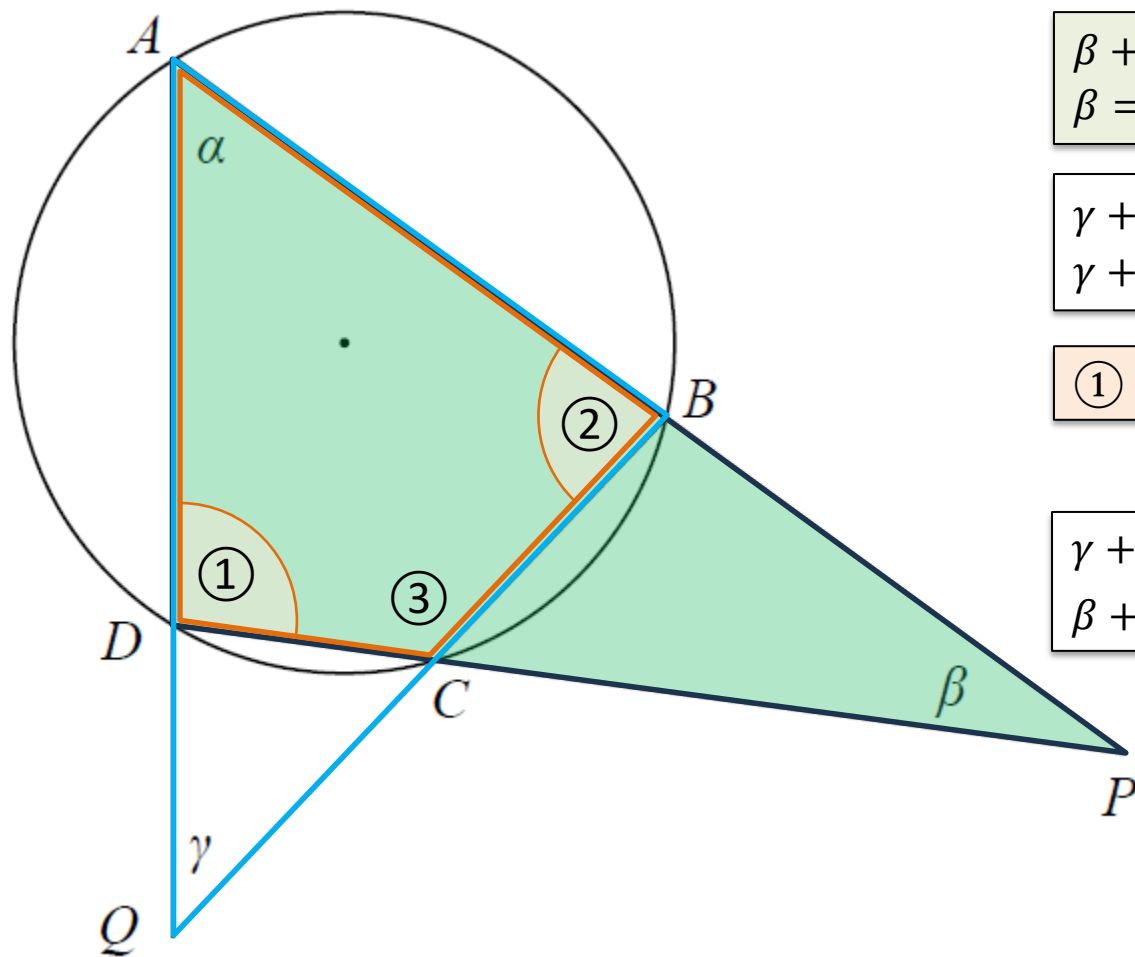
$\sigma = 50.99$

$\sigma \approx \text{€}51$

Correct to the nearest whole number.

$ABCD$ is a cyclic quadrilateral.
 The opposite sides, when extended, meet at P and Q , as shown.
 The angles α , β , and γ are as shown.

Prove that $\beta + \gamma = 180^\circ - 2\alpha$.



Label the angles ①, ② and ③ in the diagram as shown.

$$\alpha + \textcircled{2} + \gamma = 180^\circ$$

$$\gamma = 180^\circ - (\alpha + \textcircled{2})$$

3 Angles of a Triangle

$$\beta + \textcircled{1} + \alpha = 180^\circ$$

$$\beta = 180^\circ - (\textcircled{1} + \alpha)$$

3 Angles of a Triangle

$$\gamma + \beta = 180^\circ - (\alpha + \textcircled{2}) + 180^\circ - (\textcircled{1} + \alpha)$$

$$\gamma + \beta = 360^\circ - 2\alpha - (\textcircled{2} + \textcircled{1})$$

$$\textcircled{1} + \textcircled{2} = 180^\circ$$

Opposite angles cyclic quadrilateral

$$\gamma + \beta = 360^\circ - 2\alpha - 180^\circ$$

$$\beta + \gamma = 180^\circ - 2\alpha$$



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