

Leaving Cert - Revision Sheet 5

Algebra

1. Inequalities

(a) Find the solution set to the following inequalities:

(i) Set K : $3x - 11 \leq 1, x \in Z$

(ii) Set L : $-5x - 12 < 8x - 15, x \in N$

(b) List the elements of $K \cap L$

Co-ordinate Geometry

2. The line k has the equation $2x + y - 5 = 0$

(a) Find the slope of the line k

(b) Find the co-ordinates of the point where k crosses the x-axis

(c) Find the slope of a line l which is perpendicular to the line k

(d) Find the equation of the line l if it passes through the point $(3, -1)$

Statistics

3. An opposition political party's brochure states that 67% of households are not satisfied with the Taoiseach's performance. A survey was carried out to check this statistic. 700 households were surveyed, and 441 responded that they were not satisfied with the Taoiseach's performance

(a) Construct a 95% confidence interval for the proportion of households which are not satisfied.

(b) Hence, examine the claim of the opposition party.

4. A survey was carried out into the length of time that students spent doing homework per day. The distribution can be modelled using a normal distribution. The mean time was 35 minutes, and the standard deviation is 7 minutes. Use the *Empirical Rule* to answer the questions below:

(a) What percentage of the workers take between 28 minutes and 42 minutes?

(b) Complete the sentence below

The amount of time that 95% of the students spend on their homework is between _____ minutes and _____ minutes

Patterns / Sequences / Functions

5. For the function $f(x) = x^2 - 2x - 3$, find:

(a) The co-ordinates of where the graph intersects the x-axis and the y-axis.

(b) Find $f(-4)$

(c) If $f(k) = -3$ find two values for k

(d) Find the minimum point of the curve

Probability

6. A card is drawn from a normal pack of cards.

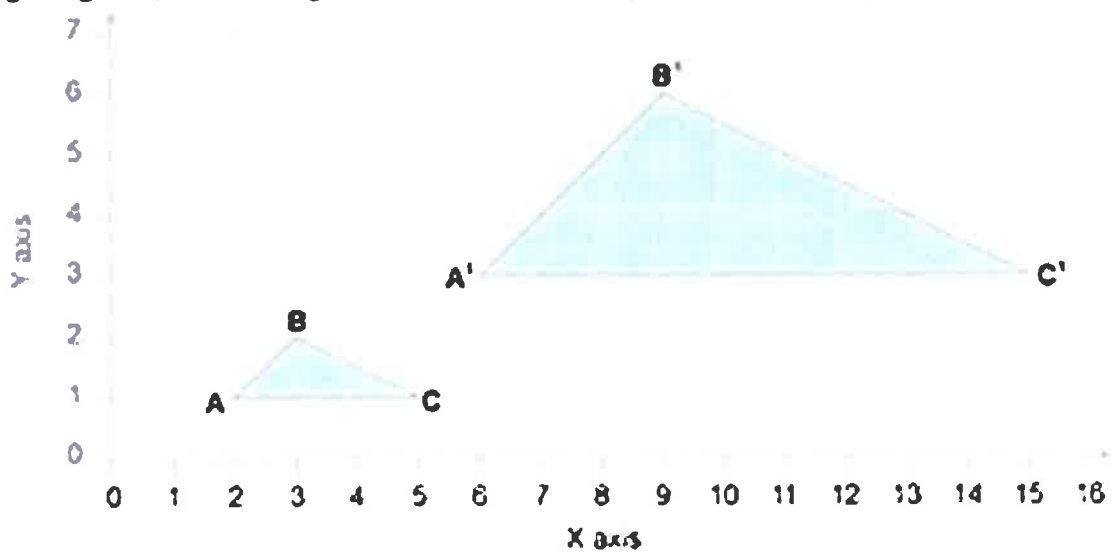
If a King is drawn you win €50. If a Jack is drawn you win €20. If a 5 or 8 is drawn you win €10.

(a) Calculate the expected value of this game.

(b) If it costs €10 to play this game, how much would you expect to win or lose overall if you played the game 10 times.

Geometry

7. In the following diagram, the triangle $A'B'C'$ is an enlargement of triangle ABC .



(a) Write down $|AC|$ and $|A'C'|$ and hence, calculate k the scale factor

(b) Calculate the area of triangle ABC and the area of $A'B'C'$

(c) Use the diagram or otherwise to find O the centre of enlargement. Show your work on the diagram

(d) If the scale factor k is changed to 4, find:

(i) The location of the new A'

(ii) The area of the new $A'B'C'$

Leaving Cert - Revision Sheet 5

Algebra

1. Inequalities

← PRETEND ITS AN EQUATION

(a) Find the solution set to the following inequalities:

(i) Set K: $3x - 1 \leq 1, x \in \mathbb{Z}$

$$\begin{array}{r} +11 \quad +11 \\ \hline 3x \leq 12 \\ x \leq 4 \end{array}$$

K: {4, 3, 2, 1, 0, -1, -2, ...}

(ii) Set L: $5x - 12 < 8x - 15, x \in \mathbb{N}$

$$\begin{array}{r} -5x + 15 \quad -5x + 15 \\ \hline 3 < 3x \\ \boxed{1 < x} \end{array}$$

$$3x > 3$$

$$\boxed{x > 1}$$

L {2, 3, 4, 5, 6, ...}

(b) List the elements of $K \cap L$

2, 3, 4

Co-ordinate Geometry

2. The line k has the equation $2x + y - 5 = 0$

(a) Find the slope of the line k

LETTERS ON SAME SIDE

$$m = \frac{-x \text{ COEFFICIENT}}{y \text{ COEFFICIENT}}$$

$$y = mx + c$$

SLOPE

$$m = \frac{-2}{1} = \boxed{-2}$$

$$\begin{array}{r} 2x + y - 5 = 0 \\ -2x + y + 5 \end{array}$$

$$y = -2x + 5$$

$$\boxed{m = -2}$$

(b) Find the co-ordinates of the point where k crosses the x-axis

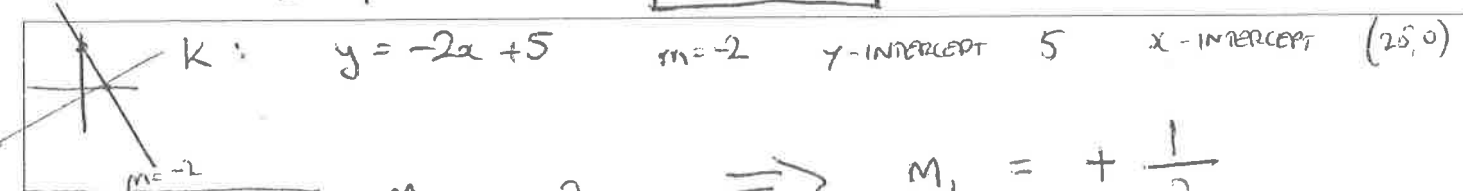
$k: 2x + y - 5 = 0$

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

$2x = 5$
 $x = \frac{5}{2}$

$(\frac{5}{2}, 0)$
 $(2.5, 0)$

(c) Find the slope of a line l which is perpendicular to the line k



PERPENDICULAR SLOPE
FLIP + CHANGE SIGN

$m_k = -\frac{2}{1} \Rightarrow m_l = +\frac{1}{2}$
 $m = \oplus \frac{1}{2}$

(d) Find the equation of the line l if it passes through the point (3, -1)

$m = \frac{1}{2}$

$x_1 = 3$
 $y_1 = -1$

$m = \frac{1}{2}$
 $x_1 = 3$
 $y_1 = -1$

$y - y_1 = m(x - x_1)$
 $y + 1 = \frac{1}{2}(x - 3)$

$2y + \frac{2}{2} = \frac{x}{2} - \frac{3}{2}$

$-x + 2y = -5$

$x - 2y = 5$

$x - 2y - 5 = 0$

$y = \frac{1}{2}x - \frac{5}{2}$

Statistics

3. An opposition political party's brochure states that 67% of households are not satisfied with the Taoiseach's performance. A survey was carried out to check this statistic. 700 households were surveyed, and 441 responded that they were not satisfied with the Taoiseach's performance

$$\hat{p} = \frac{441}{700}$$

(a) Construct a 95% confidence interval for the proportion of households which are not satisfied.

M. of E. = $\frac{1}{\sqrt{n}} = \frac{1}{\sqrt{700}} = 0.038$

$\hat{p} = \frac{441}{700} = 0.63$

0.592 < p < 0.668

(b) Hence, examine the claim of the opposition party. (HYPOTHESIS TEST)

67% = 0.67 IS OUTSIDE CONFIDENCE INTERVAL.

⇒ REJECT PARTY'S CLAIM

4. A survey was carried out into the length of time that students spent doing homework per day. The distribution can be modelled using a normal distribution. The mean time was 35 minutes, and the standard deviation is 7 minutes. Use the Empirical Rule to answer the questions below:

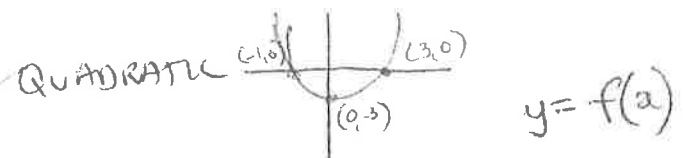
(a) What percentage of the workers take between 28 minutes and 42 minutes?

(b) Complete the sentence below

The amount of time that 95% of the students spend on their homework is between

21 minutes and 49 minutes

Patterns / Sequences / Functions



5. For the function $f(x) = x^2 - 2x - 3$ find:

(a) The co-ordinates of where the graph intersects the x-axis and the y-axis

$$x^2 - 2x - 3 = 0$$

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

$x=3$ $x=-1$

$(3, 0)$ $(-1, 0)$

$y=0$ $x=0$

$$f(x) = x^2 - 2x - 3$$

$$x=0 \quad f(0) = 0^2 - 2(0) - 3 = -3$$

Y-INTERCEPT $(0, -3)$

(b) Find $f(-4)$

$$f(-4) = (-4)^2 - 2(-4) - 3$$

$$= 21$$

(c) If $f(k) = -3$ find two values for k

$$f(x) = x^2 - 2x - 3$$

$$f(k) = k^2 - 2k - 3 = -3$$

$$k^2 - 2k = 0$$

$$(k)(k-2) = 0$$

$k=0$ $k=2$

(d) Find the minimum point of the curve

$$f(x) = x^2 - 2x - 3$$

$$2x - 2 = 0$$

$$2x = 2$$

$$x = 1$$

$$f(1) = (1)^2 - 2(1) - 3$$

$$= -4$$

$$(1, -4)$$

$$f'(x) = 2x - 2$$

$$f''(x) = 2 \rightarrow \text{MINIMUM}$$

Probability

6. A card is drawn from a normal pack of cards.

If a King is drawn you win €50. If a Jack is drawn you win €20. If a 5 or 8 is drawn you win €10.

(a) Calculate the expected value of this game.

(b) If it costs €10 to play this game, how much would you expect to win or lose overall if you played the game 10 times.

(a) MAKE A TABLE.

EXPECTED VALUE			VALUE
OUTCOMES		PROB.	
KING →	50	$\times \frac{4}{52}$	3.85
J →	20	$\times \frac{4}{52}$	1.54
5 or 8 →	10	$\times \frac{8}{52}$	1.54
ANY OTHER ELSE →	0	$\times \frac{36}{52}$	0
EXPECTED VALUE :			6.93

€6.93

(b)

COST

$$10 \times \text{€}10 = \text{€}100$$

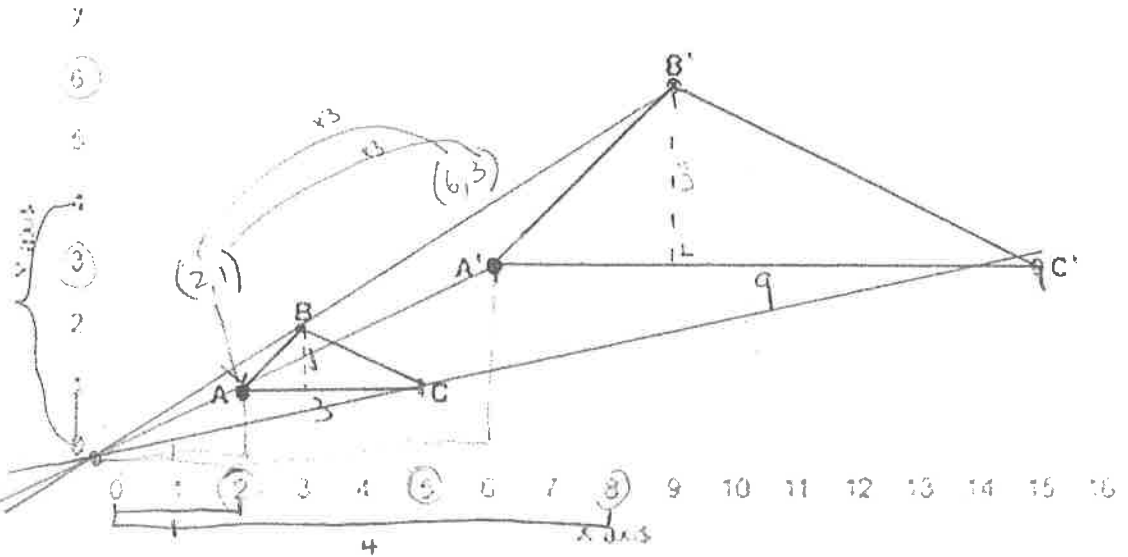
EXPECT

$$10 \times \text{€}6.93 = \text{€}69.30$$

~~€100~~ = €30.70 LOSS

Geometry

7. In the following diagram, the triangle $A'B'C'$ is an enlargement of triangle ABC .



(a) Write down $|AC|$ and $|A'C'|$ and hence, calculate k the scale factor

$$|AC| = 3 \quad |A'C'| = 9 \quad k = \frac{\text{BIG}}{\text{SMALL}} = \frac{9}{3} = \boxed{3}$$

(b) Calculate the area of triangle ABC and the area of $A'B'C'$

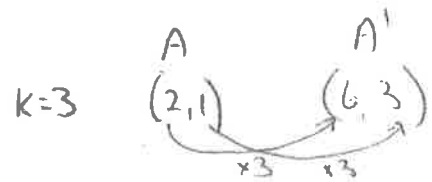
$$\begin{aligned} \text{Area}_{ABC} &= \frac{1}{2} B \times H \\ &= \frac{1}{2} (3)(1) \\ &= \boxed{1.5} \end{aligned} \quad \begin{aligned} \frac{1}{2} B \times H \\ &= \frac{1}{2} (9)(3) \\ &= \boxed{13.5} \end{aligned} \quad k = 3$$

(c) Use the diagram or otherwise to find O the centre of enlargement. Show your work on the diagram

$$O \quad (0, 0)$$

(d) If the scale factor k is changed to 4, find:

(i) The location of the new A' $(8, 4)$



(ii) The area of the new $A'B'C'$

$$\begin{aligned} \text{BIG AREA} &= \text{SMALL AREA} \times k^2 \\ &= 1.5 \times 4^2 \\ &= \boxed{24} \end{aligned}$$