

GCSE EXAM COUNTDOWN 9

Thursday 26th May 2016 AM : non-calc
Thursday 9th June 2016 AM: calculator

SINGLE BRACKETS

Expanding
 $5n(n + 3)$
 $= 5n^2 + 15n$
Multiply in

Factorising
 $= 5e + 15$
 $5(e + 3)$
Divide out

Expand & Simplify...

$5(x+3) + 6(x-4)$
 $5x + 15 + 6x - 24$
 $11x - 9$

Factorising
 $= 8n^2 + 20n$
 $4n(2n + 5)$
Highest Common Factor

DOUBLE BRACKETS

	x	3
x	$x \times x = x^2$	$3 \times x = 3x$
2	$2 \times x = 2x$	$3 \times 2 = 6$

$x^2 + 2x + 3x + 6$
 or...
 $x^2 + 5x + 6$

Expanding
 $(n + 2)(n + 4)$
 $n^2 + 4n + 2n + 8$
 $n^2 + 6n + 8$

FACTORISING
 $n^2 + 7n + 10$
Add to 1×10
 2×5
Factors
 $(n+2)(n+5)$

1. Factorise:

- $3x + 12$
- $8x + 20$
- $x^2 + 17x + 70$
- $x^2 + 12x + 35$
- $x^2 + 2x - 35$

2. Expand

- $5(x + 3)$
- $2(3x - 7)$
- $t(t + 4)$
- $(x + 4)(x + 5)$
- $(x + 7)(x - 2)$
- $(x + 9)(x - 9)$

Answers: 1. a) $3(x + 4)$ b) $4(2x + 5)$ c) $(x + 10)(x + 7)$ d) $(x + 5)(x + 7)$ e) $(x + 7)(x - 5)$
 2. a) $5x + 15$ b) $6x - 14$ c) $t^2 + 4t$ d) $x^2 + 9x + 20$ e) $x^2 + 5x - 14$ f) $x^2 - 81$

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Day 29
Number & Algebra

60 Daily Tweets for GCSE Maths

Have a go at answering these questions!

Question 1 – Foundation & Higher Tier GCSE

a) Solve this inequality: $4c + 16 \geq 12$

b) Expand and simplify: $(n - 6)(n + 3)$

c) Rearrange this formula to make d the subject:
 $H = 4d + 7$

Question 2 – Foundation & Higher Tier GCSE

a) What single multiplier would you use to complete:
 i. A percentage increase of 6%
 ii. A percentage decrease of 6%

b) Emily invests £2000 into a bank account which pays 10% interest per annum. What will this investment be worth after 3 years?

c) Tanesha buys a laptop in a sale, where everything has been reduced by 30%, for £364. What was the original price?

Answers and working out will be tweeted tomorrow along with two more questions in preparation for Geometry & Measures.

Question 1	Yesterday's solutions	Question 2	
a) <input type="text" value="20"/> <input type="text" value="20"/>	<input type="text" value="20"/> <input type="text" value="24"/> <input type="text" value="16"/>	a) 7.03×10^{-2}	
b) <input type="text" value="12"/> <input type="text" value="12"/> <input type="text" value="13"/> <input type="text" value="24"/>		b) 4.87×10^{12}	
		c) $1 : 1.95 \times 10^{12}$	

STRAIGHT LINE GRAPHS

Plotting Straight Line Graphs

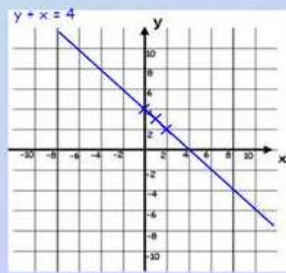
- To plot a graph, you need to know at least 3 points

Plot a graph of the equation;

$$y + x = 4$$

Choose any values for x, what y value will go with them?

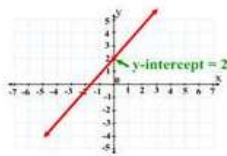
- $x = 0 \quad y = 4 \quad (0, 4)$
- $x = 1 \quad y = 3 \quad (1, 3)$
- $x = 2 \quad y = 2 \quad (2, 2)$



$$y = mx + c$$

m = Gradient or Slope
= Rise Up / Run Across

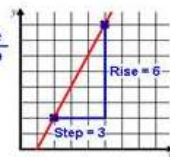
c = Y-intercept
= Crosses Y-Axis



$$\text{Gradient} = \frac{\text{Rise}}{\text{Step}}$$

$$= \frac{6}{3}$$

$$= 2$$



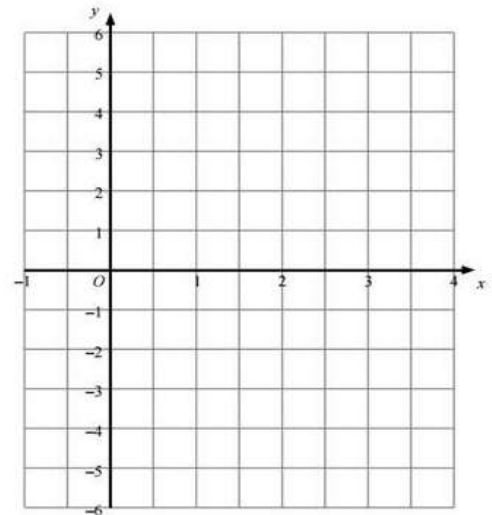
If you're given two points (x_1, y_1) and (x_2, y_2)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

- (a) Complete the table of values for $y = 2x - 3$

x	-1	0	1	2	3	4
y		-3	-1			

- (b) On the grid, draw the graph of $y = 2x - 3$



Answer: Co-ordinates (-1, -5) (0, -3) (1, -1) (2, 1) (3, 3) (4, 5) – joined with a straight line

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Day 30
Geometry & Measures

60 Daily Tweets for GCSE Maths

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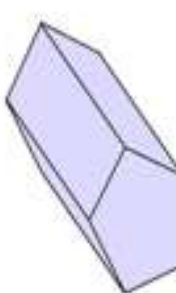
You'll need a calculator for these questions!

Question 1 – Foundation & Higher Tier GCSE

a) Calculate:

- The side length of a square with an area of 36cm^2
- The radius of a circle (to 2 d.p.) with an area of 300cm^2

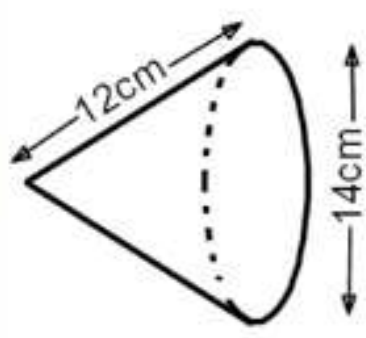
b) How many faces, edges and vertices does this 3D shape have:



Question 2 – Higher Tier GCSE only

Calculate:

- The perpendicular height of this cone (to 2 d.p.)
- The angle between the slant height and the base (to 1 d.p.)



Answers and working out will be tweeted tomorrow along with two more questions in preparation for Statistics.

Question 2

a) (i) $\times 1.06$ (ii) $\times 0.94$

b) $2000 + 10\% \rightarrow 2200 + 10\% \rightarrow 2420 + 10\% \rightarrow \pounds 2662$

c) $70\% = \pounds 364 \rightarrow 10\% = \pounds 52 \rightarrow 100\% \text{ (original amount)} = \pounds 520$

Question 1

a) $4c \geq -4 \rightarrow c \geq -1$

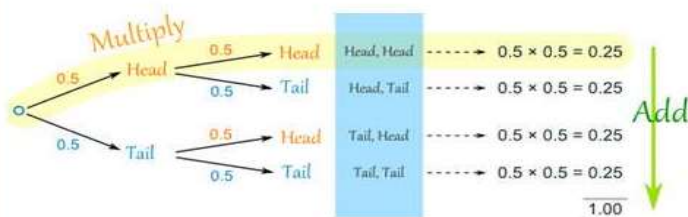
b) $n^2 + 3n - 6n - 18 \rightarrow n^2 - 3n - 18$

c) $H - 7 = 4d \rightarrow \frac{H - 7}{4} = d \rightarrow d = \frac{H - 7}{4}$

Yesterday's solutions

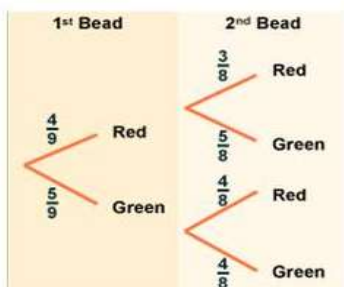
Question 2

PROBABILITY – TREE DIAGRAMS



Watch out for 'without replacement' questions. 'Jack had 9 sweets in a bag and ate two of them'.

The denominator goes down by one on the second Branch.



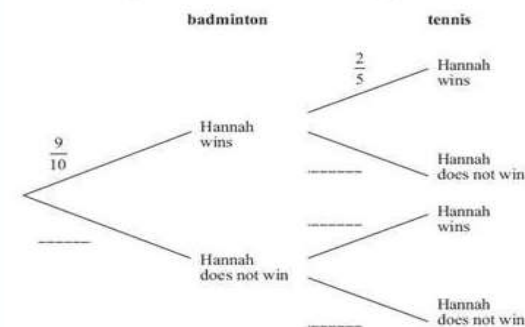
Answer: 1. $\frac{5}{10} \times \frac{4}{9} + \frac{3}{10} \times \frac{2}{9} + \frac{2}{10} \times \frac{1}{9} = \frac{28}{90}$

2. Badminton $\frac{1}{10}$ Tennis $\frac{3}{5}, \frac{2}{5}, \frac{3}{5}$

1. There are 5 red pens, 3 blue pens and 2 green pens in a box. Gary takes at random a pen from the box and gives the pen to his friend. Gary then takes at random another pen from the box.

Work out the probability that both pens are the same colour.

2. Complete this tree diagram.



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Day 31
Statistics

60 Daily Tweets for GCSE Maths

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Have a go at answering these questions!

Question 1 – Foundation & Higher Tier GCSE

20 people who all weigh 80kg decide to lose weight. After 6 months they all weigh themselves again.

(a) Explain fully what the graph shows

(b) Estimate the new weight of someone who completes 120 hrs of exercise

(c) Describe why one person doesn't fit the pattern

Question 2 – Foundation & Higher Tier GCSE

A school wants to change its daily start and finish times. The head teacher decides to give a questionnaire to a stratified sample of 80 people. How many people in each group should he ask?

Governors	Teachers	Non-teaching staff	Pupils
23	62	45	820

Answers and working out will be tweeted tomorrow along with two more questions in preparation for Number & Algebra.

Question 1

(i) Length = $\sqrt{36} = 6\text{cm}$

(ii) Radius = $\sqrt{(300 \div \pi)} = 9.77\text{cm}$

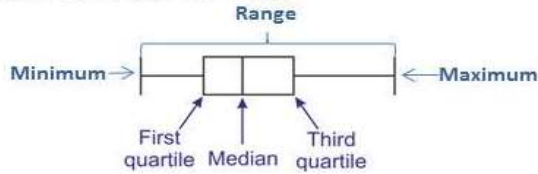
Faces = 7, Edges = 15, Vertices = 10

Question 2

a) Pythagoras $\rightarrow h = \sqrt{(12^2 - 7^2)}$
 $h = 9.75\text{cm}$

b) SOHCAHTOA $\rightarrow \cos x = 7/12$
 $x = 54.3^\circ$

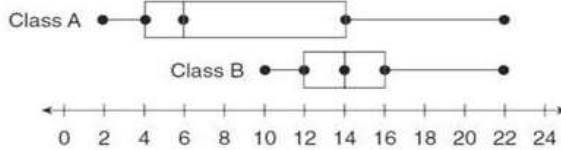
BOX AND WHISKER PLOT



You may be asked to draw a box plot from a list of data or by getting the values from a cumulative frequency graph.

Comparing

A School was running two revision classes for year 11 students. The attendance at each session, for each class, was noted and the results are summarised below.



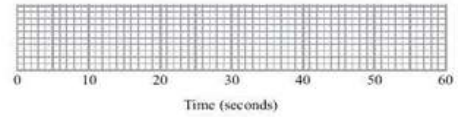
Medians: On average class B was more popular the median attendance was 14 compared to 6 for class A
Range: Class B's numbers were more predictable with a range of 12 compared to class A's range of 20.

Answer: Min 5, LQ 14, Med 25, UQ 30, Max 44.

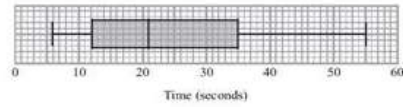
Here are the times, in seconds, that 15 people waited to be served at Rose's garden centre.

- 5 9 11 14 15 20 22 25 27 27 28 30 32 35 44

(a) On the grid, draw a box plot for this information.



The box plot below shows the distribution of the times that people waited to be served at Green's garden centre.



(b) Compare the distribution of the times that people waited at Rose's garden centre and the distribution of the times that people waited at Green's garden centre.

The median wait time at Green's was 21 seconds compared to 25 seconds at Rose's – so they had lower waiting times on average. However the range of waiting times at Greens was 49 compared to 39 at Rose's – so Rose's were more consistent with there service and it was easier to predict how long you would have to wait.

Day 32
Number &
Algebra

60 Daily Tweets for
GCSE Maths

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Have a go at answering these questions!

Question 1 – Foundation & Higher Tier GCSE

- (a) Calculate: (i) $\frac{7}{8} - \frac{2}{5}$ (ii) $\frac{7}{8} \times \frac{2}{5}$
(b) Which of these fractions are recurring decimals? $\frac{1}{8}, \frac{5}{6}, \frac{2}{3}, \frac{4}{5}, \frac{1}{4}$
(c) There are 19 boys and 6 girls in a maths class. What percentage of the class are girls?



Question 2 – Higher Tier GCSE only

Solve these simultaneous equations:

$$y = 2x^2 + 4x - 11$$

$$y + 3x = 4$$



Answers and working out will be tweeted tomorrow along with two more questions in preparation for Geometry & Measures.

Question 1

- (a) The graph shows that the more people exercised the lower their final weight was (a negative correlation)
(b) = 70 → 72 kg
(c) One person lost a lot of weight without doing very much exercise

Yesterday's solutions

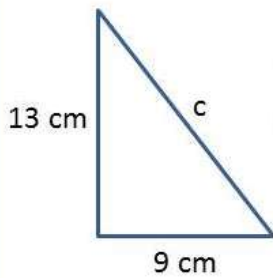
- Total people = 950 $950 \div 80 = 11.875$
 $23 \div 11.875 = 1.68 = 2$ governors
 $62 \div 11.875 = 5.22 = 5$ teachers
 $45 \div 11.875 = 3.79 \approx 4$ non-teachers
 $820 \div 11.875 = 69.05 = 69$ pupils

Question 2

GCSE EXAM COUNTDOWN 13

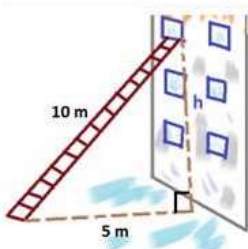
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PYTHAGORAS – FINDING HYPOTENUSE



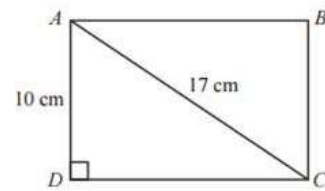
$$\begin{aligned} a^2 + b^2 &= c^2 \\ 9^2 + 13^2 &= c^2 \\ 81 + 169 &= c^2 \\ 250 &= c^2 \\ c &= \sqrt{250} \\ c &= 15.8 \end{aligned}$$

PYTHAGORAS – FINDING A SHORTER SIDE



$$\begin{aligned} h^2 &= 10^2 - 5^2 \\ h^2 &= 100 - 25 \\ h^2 &= 75 \\ h &= \sqrt{75} \\ h &= 8.66 \end{aligned}$$

1.



$ABCD$ is a rectangle.
 $AC = 17$ cm.
 $AD = 10$ cm.

Calculate the length of the side CD .
Give your answer correct to one decimal place.

2.

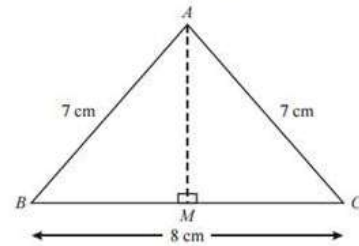


Diagram NOT accurately drawn

Work out the length, in centimetres, of AM .
Give your answer correct to 2 decimal places.

Answers: 1. 13.7

2. 5.74

Have a go at answering these questions!

Question 1 – Foundation & Higher Tier GCSE

- a) A rectangle has side lengths of 8cm and 15cm. What is the area of a rectangle which has side lengths which are 40% bigger than the first rectangle.
- b) A lorry maintains a constant speed of 60mph.
(i) How far does it travel in 20 minutes?
(ii) How long will it take to travel 150 miles?

Question 2 – Higher Tier GCSE only



Vectors $\vec{OA} = \mathbf{a}$ and $\vec{OB} = \mathbf{b}$
Point P splits line OA in the ratio 2:1
Point Q splits line OB in the ratio 1:3
Calculate vector \vec{PQ} in terms of \mathbf{a} and \mathbf{b}

[Fully simplify your answer]

Answers and working out will be tweeted tomorrow along with two more questions in preparation for Statistics & Probability.

Question 1

(a) $\frac{35}{40} - \frac{16}{40} = \frac{19}{40}$

(b) $\% = 0.8333... \times 100 = 83.33\%$

(c) $\frac{6}{25} = \frac{24}{100} = 24\%$

Yesterday's solutions

Question 2

Rearrange $y + 3x = 4 \rightarrow y = 4 - 3x$

Combine $\rightarrow 2x^2 + 4x - 11 = 4 - 3x$

Rearrange $\rightarrow 2x^2 + 7x - 15 = 0$

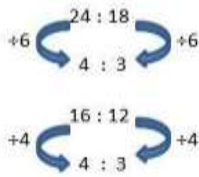
Factorise $\rightarrow (2x - 3)(x + 5) = 0$

Solve $\rightarrow x = 1\frac{1}{2}$ or $x = -5 \rightarrow y = -\frac{1}{2}$ or $y = 19$

GCSE EXAM COUNTDOWN 14

SIMPLIFYING RATIOS

Find the HCF and divide



Simplify the ratio 5 cm : 10 mm

Change so that both are in mm



SHARING IN A GIVEN RATIO

Divide 45 in the ratio 2 : 3

For the ratio 2 : 3 the number of Shares are $2 + 3 = 5$

Amount for one share = Total amount \div number of shares

One Share = $45 \div 5 = 9$

2 shares: $2 \times 9 = 18$

3 shares: $3 \times 9 = 27$

Check that these add to 27
 $18 + 27 = 45$

45 divided in the ratio 2 : 3 is 18 : 27

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- A piece of wood is of length 45 cm. The length is divided in the ratio 7 : 2. Work out the length of each part.
- Ann and Bob shared £240 in the ratio 3 : 5. Ann gave a **half** of her share to Colin. Bob gave a **tenth** of his share to Colin. What fraction of the £240 did Colin receive?
- Pat and Julie share some money in the ratio 2 : 5. Julie gets £45 more than Pat. How much money did Pat get?

Answers: 1. 35cm and 10cm
2. $\frac{1}{4}$ 3. £30

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Day 34
Statistics & Probability
60 Daily Tweets for
GCSE Maths

You'll need a calculator for these questions!

Question 1 – Foundation & Higher Tier GCSE

The area of some islands in the Pacific ocean are measured and put into a table.

Estimate the mean area.

Area (km ²)	Frequency
$0 \leq A < 5$	7
$5 \leq A < 10$	24
$10 \leq A < 20$	18
$20 \leq A < 40$	11

Question 2 – Higher Tier GCSE only

The numbers 1 \rightarrow 100 are put on prizes in a "Bran tub" at a school fair. Daniel buys two tickets and delves into the tub for his two prizes. What is the probability of him picking:



- Two even numbered prizes
- One even numbered prize and one odd numbered prize

Answers and working out will be tweeted tomorrow along with two more questions in preparation for Geometry & Algebra.

Question 1

a) New side lengths:

$$8 \times 1.4 = 11.2 \text{ and } 15 \times 1.4 = 21$$

$$\text{Area} = 11.2 \times 21 = 235.2 \text{ cm}^2$$

- b) (i) 20 miles (ii) 2½ hours

Yesterday's solutions

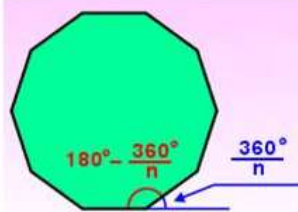
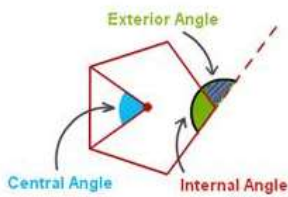
$$\begin{aligned}
 \overline{PQ} &= \overline{PA} + \overline{AQ} = \frac{1}{2}\overline{OA} + \frac{1}{2}\overline{OB} \\
 &= \frac{1}{2}a + \frac{1}{2}(b - a) \\
 &= \frac{1}{2}a + \frac{1}{2}b - \frac{1}{2}a \\
 &= \frac{2b - 5a}{4} \quad \frac{2b}{4} \quad \frac{5a}{4}
 \end{aligned}$$

Question 2

GCSE EXAM COUNTDOWN 15

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Thursday 9th June 2016 AM: calculator

ANGLES IN POLYGONS

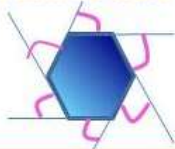


Interior Angles
Add to
 $(n - 2) \times 180$

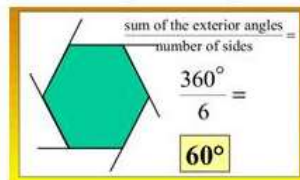


Shape	# of sides	Interior Angles
triangle	3	sum to 180
square	4	sum to 360
pentagon	5	sum to 540
hexagon	6	sum to 720
heptagon	7	sum to 900
octagon	8	sum to 1080
nonagon	9	sum to 1260

Exterior Angles
Add to 360



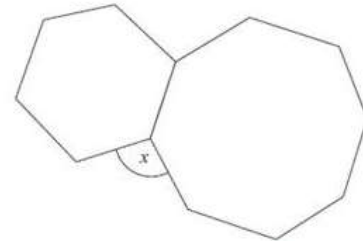
For a Regular Hexagon



1. The size of each exterior angle of a regular polygon is 40° . Work out the number of sides of the regular polygon.

2. The size of each interior angle of a regular polygon is 156° . Work out the number of sides of the regular polygon.

3. The diagram shows a regular hexagon and a regular octagon. Calculate the size of angle x



Answers: 1. 9 sides 2. 15 sides 3. $360 - (120 + 135) = 105$.

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Day 35
Geometry,
Measures &
Algebra

60 Daily Tweets for
GCSE Maths

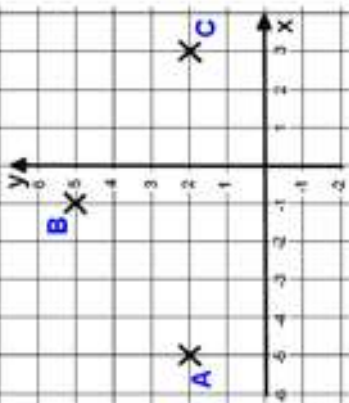


Have a go at answering these questions!

Question 1 – Foundation & Higher Tier GCSE

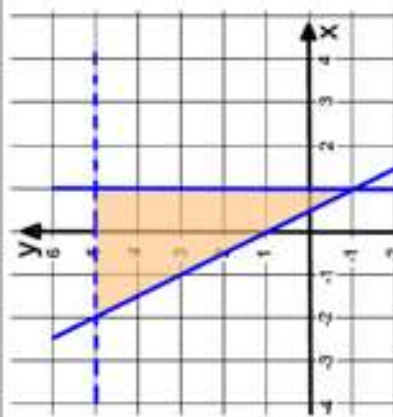
ABCD is a rhombus but D has not been drawn on the grid!

- (a) What are the coordinates of A & D?
(b) What are the equations of the shape's 2 lines of symmetry?



Question 2 – Higher Tier GCSE only

Name the three inequalities which create this shaded area



Answers and working out will be tweeted tomorrow along with two more questions in preparation for Algebra & Geometry.

Question 1

Estimate of mean

$$= \frac{(2.5 \times 7) + (7.5 \times 24) + (15 \times 18) + (30 \times 11)}{60}$$

$$= \frac{17.5 + 180 + 270 + 330}{60} = \frac{797.5}{60} = 13.29 \text{ km}^2$$

Yesterday's solutions

(a) $P(2 \text{ evens}) = \frac{50}{100} \times \frac{49}{99} = \frac{49}{198}$
 (b) $P(1 \text{ even}/1 \text{ odd or } 1 \text{ odd}/1 \text{ even})$

$$= \frac{50}{100} \times \frac{50}{99} + \frac{50}{100} \times \frac{50}{99} = \frac{50}{99}$$

Question 2