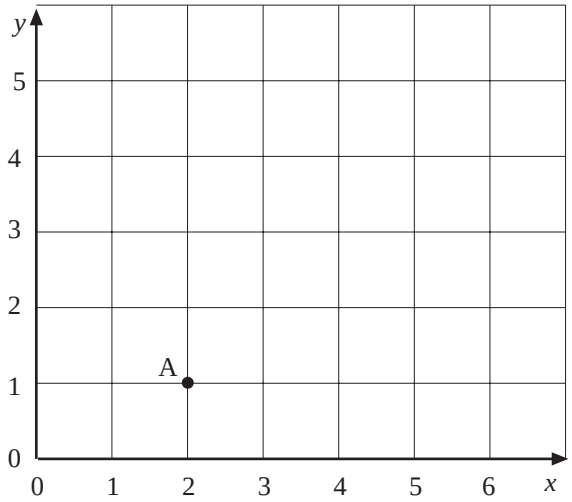
UNITS 13 – 16

Miscellaneous Exercises

Note

Starred* questions are for *Academic Route* only.

1.



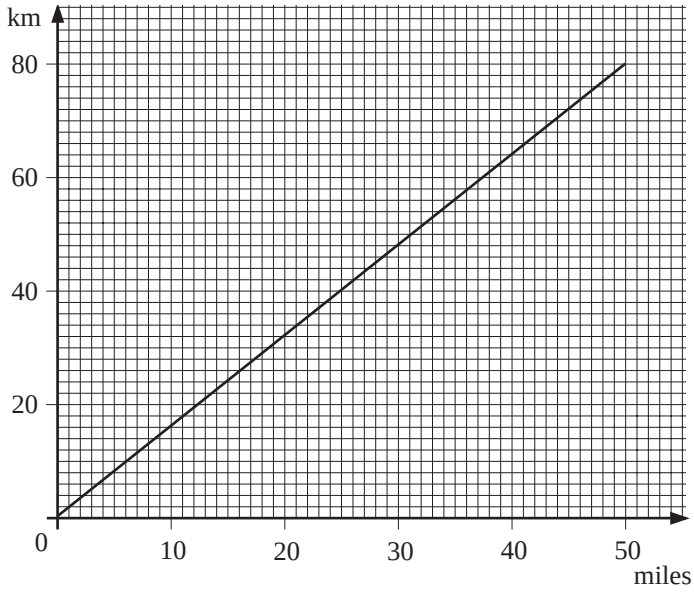
(a) Write down the coordinates of the point A.

B is the point with coordinates (4, 3).

(b) Copy the diagram and mark with a cross the position of B on the grid.

(LON)

2. This is a conversion graph for miles and kilometres.



(a) How many miles are equivalent to 32 kilometres?

(b) How many kilometres are equivalent to 15 miles?

(LON)

3. (a) Complete a copy of this table of values for $y = 3x - 1$.

x	–2	–1	0	1	2	3
y			–1			8

(b) Draw the graph of $y = 3x - 1$ on a grid.

(c) Use your graph to find

(i) the value of x when $y = 3.5$

(ii) the value of y when $x = -1.5$.

(LON)

4. Given that

$$y = x^2 + 1$$

(a) complete a copy of the table below,

x	0	1	2	3	4	5	6	7
y				10			37	

(b) plot these points on a grid and hence draw the graph of $y = x^2 + 1$,

(c) use your graph to find the value of x when $y = 45$.

(NEAB)

5. The table shows the charge for using different numbers of units of electricity.

Units	0	200	500	700	900	1000
Charge (£)	10	34	70	94	118	130

(a) Plot these points on a suitable grid.

(b) Use your graph to find

(i) the charge for using 600 units of electricity,

(ii) how many units of electricity you have used if you are charged £50.

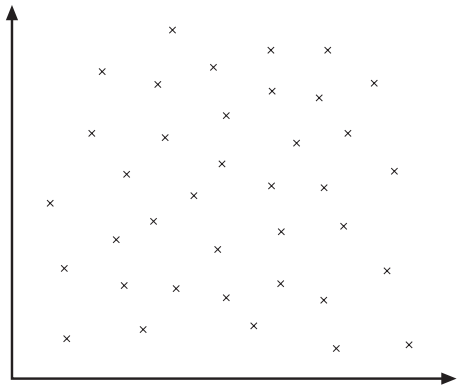
6. There are three types of correlation.

Type A: Positive correlation

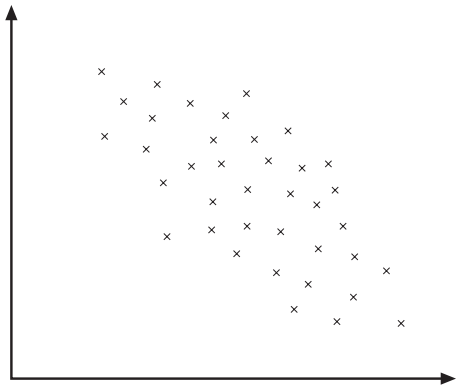
Type B: No correlation

Type C: Negative correlation

(a) State which type of correlation is shown by each of these graphs.



Graph 1



Graph 2

(b) One type of correlation is not illustrated.

On axes, sketch a diagram to show this type of correlation.

(NEAB)

7. Information about oil was recorded each year for 12 years.

The table shows the amount of oil produced (in billions of barrels) and the average price of oil (in £ per barrel).

Amount of oil produced (billions of barrels	7.0	11.4	10.8	11.3	9.6	8.2	7.7	10.9	8.0	9.9	9.2	9.4
Average price of oil (£ per barrel)	34	13	19	12	23	33	30	12.5	28.5	13.5	26.5	15.5

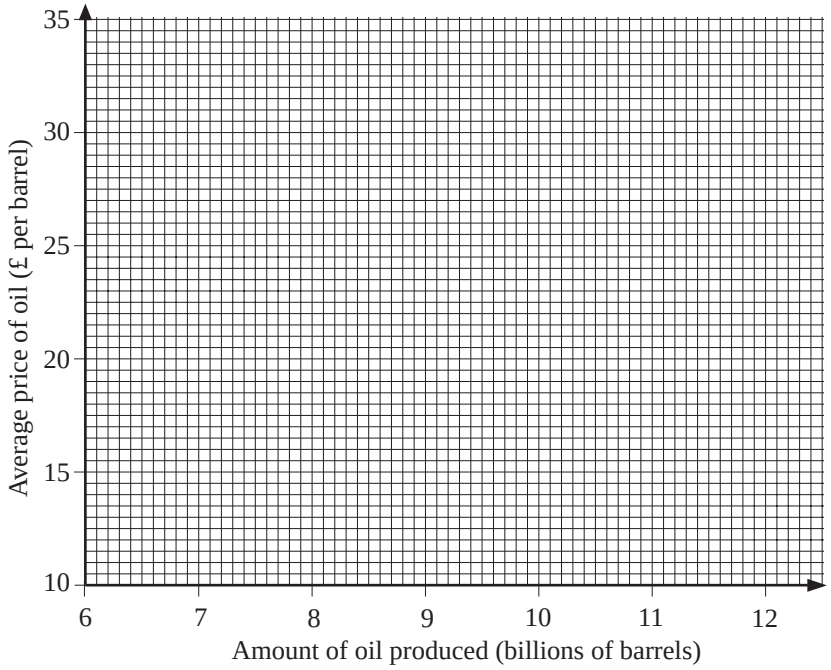
(a) On a copy of the following grid, draw a scatter graph to show the information in the table.

(b) Describe the correlation between the average price of oil and the amount of oil produced.

(c) Draw a line of best fit on the scatter graph.

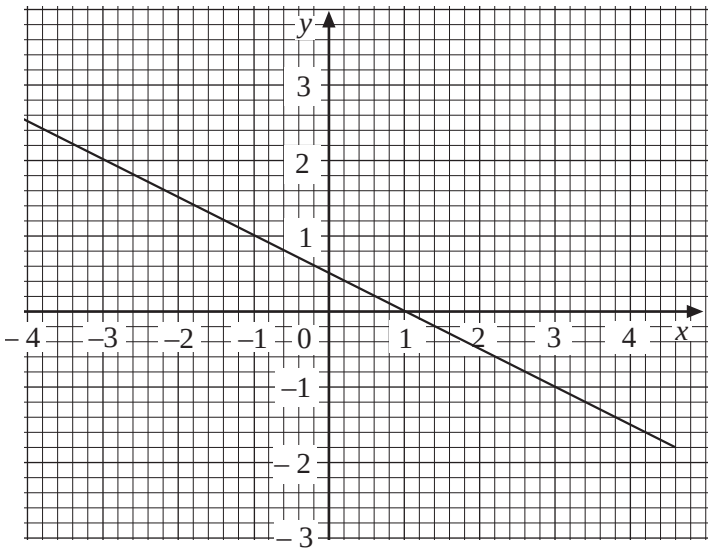
In another year the amount of oil produced was 10.4 billion barrels.

(d) Use your line of best fit to estimate the average price of oil per barrel in that year.



(LON)

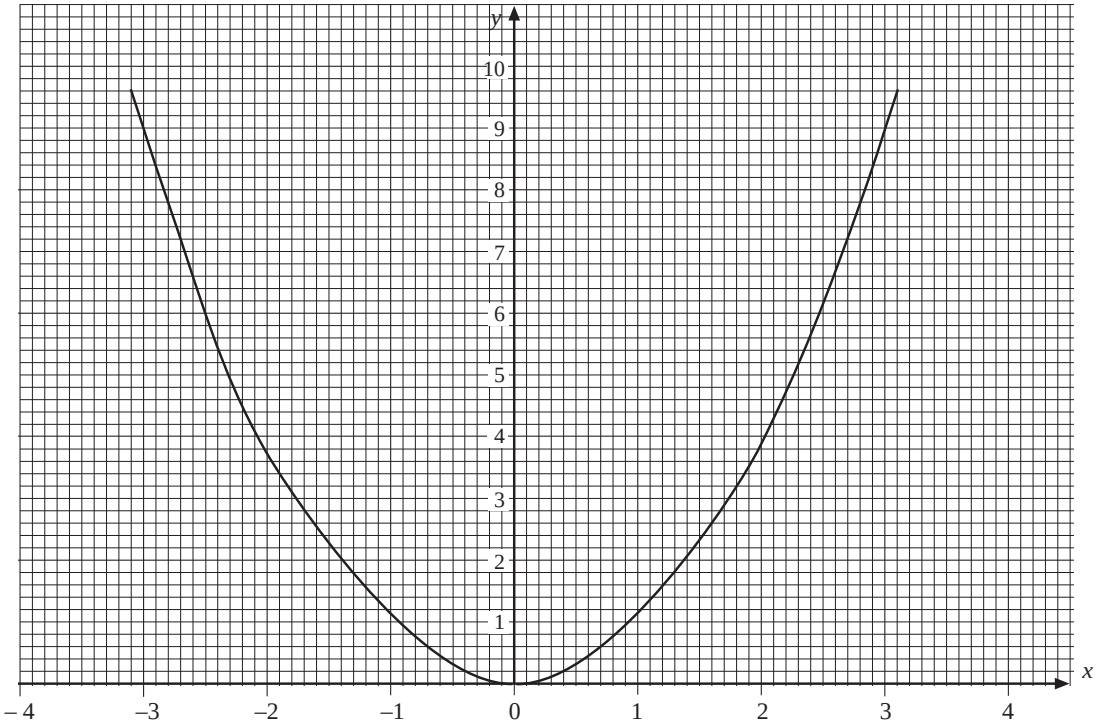
* 8. What is the equation of this line?



(SEG)

* 9. (a) On a copy of the following graph , draw the line $y = 4 - x$ for values of x from -4 to $+4$.

(b) What are the coordinates of the points where the graph $y = 4 - x$ meets the curve?



(SEG)

10. The seating plan of a theatre is drawn to the scale of 1 : 80.

On the plan the width of a seat is 0.5 cm.

(a) What is the actual width of a seat?

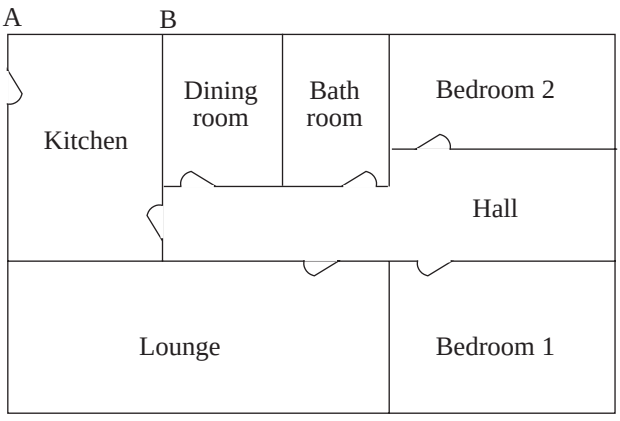
(b) The theatre has 2100 seats.

The number of seats is increased by 5%.

Calculate the total number of seats after the increase.

(SEG)

11. The following diagram shows an accurate plan of a bungalow drawn to a scale of 1 : 200.



(a) Measure AB, the width of the kitchen on the plan and use your answer to find the actual width of the kitchen in metres.

(b) A cupboard in the bungalow has a height of 30 inches.

Estimate the height of the cupboard in centimetres.

(SEG)

12. The scale diagram below shows the positions of two oil rigs, A and B, which are 7 km apart.

Scale 1 cm to 1 km.

Ships are asked to keep out of the region less than 2 km from oil rig B.

(a) On a copy of the diagram, shade that part of the diagram which represents the region less than 2 km from B.

A boat sails so that it is always the same distance from A as it is from B.

(b) On the diagram draw the route taken by the boat.

The 7 km distance has been rounded to the nearest kilometre.

(c) (i) Write down the minimum distance it could be.

(ii) Write down the maximum distance it could be.

(LON)

13. Plot these points on a grid.

(1, 5) (2, 1) (4, 1) (6, 5)

(a) Join the points, in order, to form a quadrilateral.

(c) What is the special name given to this quadrilateral?

(d) On the grid, draw an enlargement of the quadrilateral.

Make each side *twice* its original length.

(MEG)

14. Two ships, A and B, both hear a distress signal from a fishing boat.

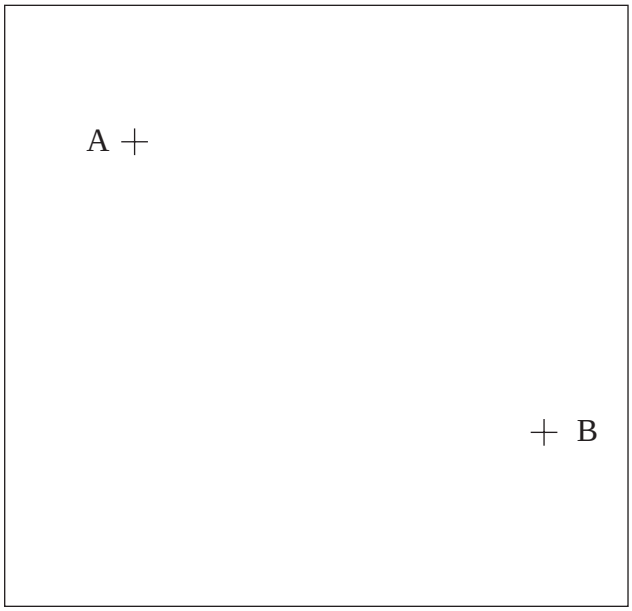
The positions of A and B are shown on the map below.

The map is drawn using a scale of 1 cm to represent 1 km.

The fishing boat is less than 4 km from ship A and is less than 4.5 km from ship B.

Use accurate construction on a copy of the diagram below to show the region which contains the fishing boat. Shade this region.

Scale 1 cm = 1 km

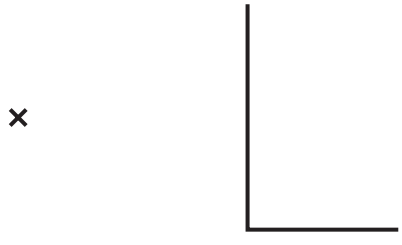


(NEAB)

15. (a) The letter L is to be enlarged by the scale factor two.

The centre of the enlargement is marked by a cross.

Copy the figure below and construct accurately the new letter showing clearly all your construction lines.



(b) The letter L is made from two perpendicular rods AB and BC.

$AB = 3$ cm, $BC = 2$ cm.

The letter L is rotated through $90°$ clockwise about the point C.

Draw accurately the locus of the point A.

(SEG)

16. The diagram shows a pentagon.

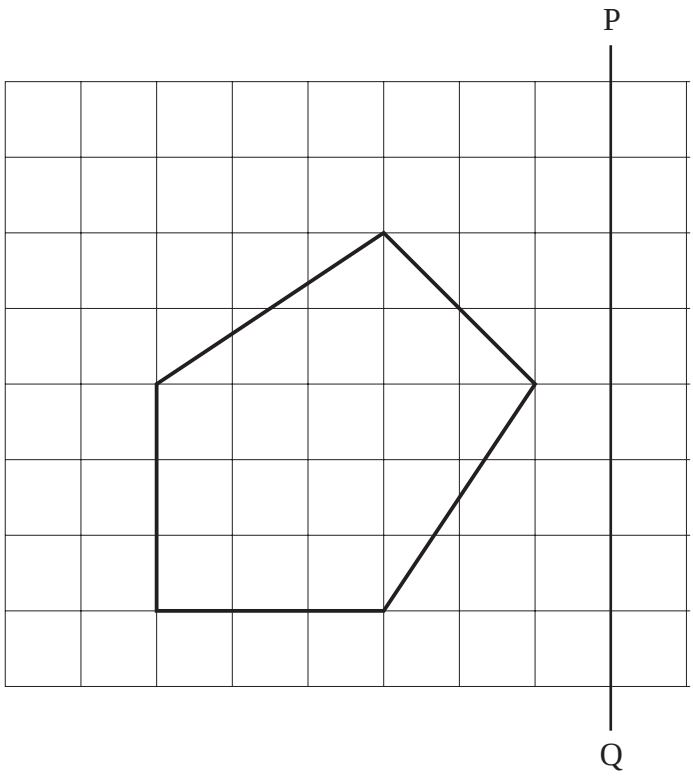
(a) Each square on the diagram has an area of $1\ \text{cm}^2$.

Work out the area of the pentagon.

(b) How many lines of symmetry has this pentagon?

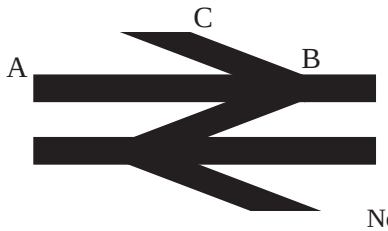
(c) The pentagon is reflected on the mirror line PQ.

Copy the diagram, extending the grid lines to the right of the line PQ, and draw the reflection on it.



(SEG)

* 17. (a) The British Rail logo shown below is to be enlarged for a new poster.



Not to scale

The distance AB is 3 cm on the original shape.

On the enlarged shape AB is 13.5 cm and BC is 7.8 cm.

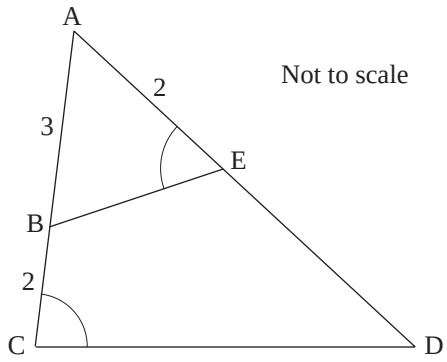
What is the distance BC on the original shape?

(b) In the diagram $AB = 3\text{ cm}$, $BC = 2\text{ cm}$ and $AE = 2\text{ cm}$.

Angles AEB and ACD are equal.

(i) Explain why triangle ABE is similar to triangle ADC.

(ii) Calculate the length of ED.

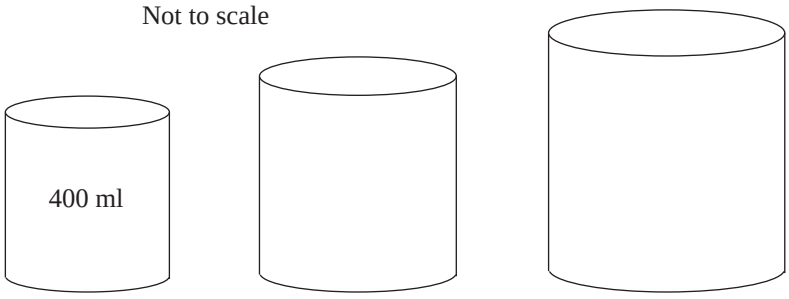


Not to scale

(SEG)

* 18. Tins of SUPER SOUP come in three sizes.

Not to scale



Standard size Family size Giant size

The height and radius of the family size tin are each 1.2 times the height and radius of the standard size tin.

(a) The volume of the standard size tin is 400 ml.

Calculate the volume of a family size tin.

The height of the giant size tin is 1.2 times the height of the family size tin. The radius of the giant size tin is 1.5 times the radius of the family size tin.

(b) Calculate the volume of the giant size tin

(SEG)

19. A sponge cake for five people needs 75 g of sugar.

John makes a sponge cake for eight people.

(a) Calculate the weight of sugar he needs.

The small cake serves five people.

The larger cake serves eight people.

(b) Calculate the percentage increase in the number of people served by making the larger cake.

(SEG)

20. The following information about vitamin content is printed on the side of a breakfast cereal packet.

	100 g serving	*30 g serving*
Vitamin C	..... mg	16.2 mg
Vitamin B	1.7 mg	..... mg

(a) Calculate and write down the values missing from the table.

(b) The 16.2 mg of vitamin C is 24% of the recommended daily amount of vitamin C.

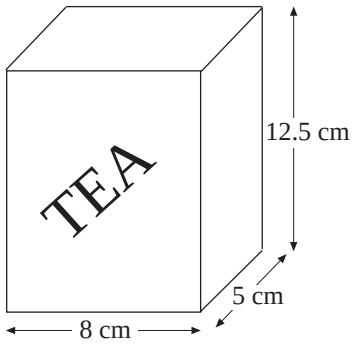
What is the recommended daily amount of vitamin C?

(c) The recommended daily amount of vitamin B is 2 mg.

What percentage of the daily amount is provided by the 100 g serving?

(SEG)

21. The diagram represents a tea packet in the shape of a cuboid.



(a) Calculate the volume of the packet.

There are 125 grams of tea in a full packet.

Jason has to design a new packet that will contain 100 grams of tea when it is full.

(b) (i) Work out the volume of the new packet.

(ii) Express the weight of the tea in the new packet as a percentage of the weight of the tea in the packet.

(LON)

22. List the values of n where n is a whole number such that

$$-4 < n \leq 7$$

* 23. (a) Draw two graphs to solve these simultaneous equations.

$$y - x = 2, \quad 3x + 4y = 24$$

(b) (i) On your graph, label with the letter R the region where the inequalities $y - x \geq 2$ and $3x + 4y \leq 24$ are satisfied.

(ii) The values of x and y are whole numbers.

Write down one possible pair of values that satisfy these inequalities.

(SEG)

* 24. (a) On a copy of the axes below, draw the graph of $y = x^2 - 3x$.

(b) Use your graph to find the two solutions of the equation $x^2 - 3x = -1$.

(c) Using your graph, or otherwise, solve the inequality $x^2 - 3x < 0$.