Write your name here

Surname		Other names

**Pearson Edexcel
Level 1/Level 2 GCSE (9 - 1)**

Centre Number

Candidate Number

Mathematics

Paper 1 (Non-Calculator)

Higher Tier

Sample Assessment Materials for first teaching September 2015
Time: 1 hour 30 minutes

Paper Reference
1MA1/1H

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need*.
- **Calculators must not be used.**
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out** with your **answer clearly identified** at the **end of your solution**.

Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question*.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Formulae Sheet

Perimeter, area, surface area and volume formulae

Where *r* is the radius of the sphere or cone, *l* is the slant height of a cone and *h* is the perpendicular height of a cone:

Curved surface area of a cone = $\pi r l$

Surface area of a sphere = $4\pi r^2$

Volume of a sphere = $\dfrac{4}{3}\pi r^3$

Volume of a cone = $\dfrac{1}{3}\pi r^2 h$

Kinematics formulae

Where *a* is constant acceleration, *u* is initial velocity, *v* is final velocity, *s* is displacement from the position when *t* = 0 and *t* is time:

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

$$v^2 = u^2 + 2as$$

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1   Liam, Sarah and Emily shared some money in the ratio 2 : 3 : 7.
    Emily got £80 more than Liam.

    How much money did Sarah get?
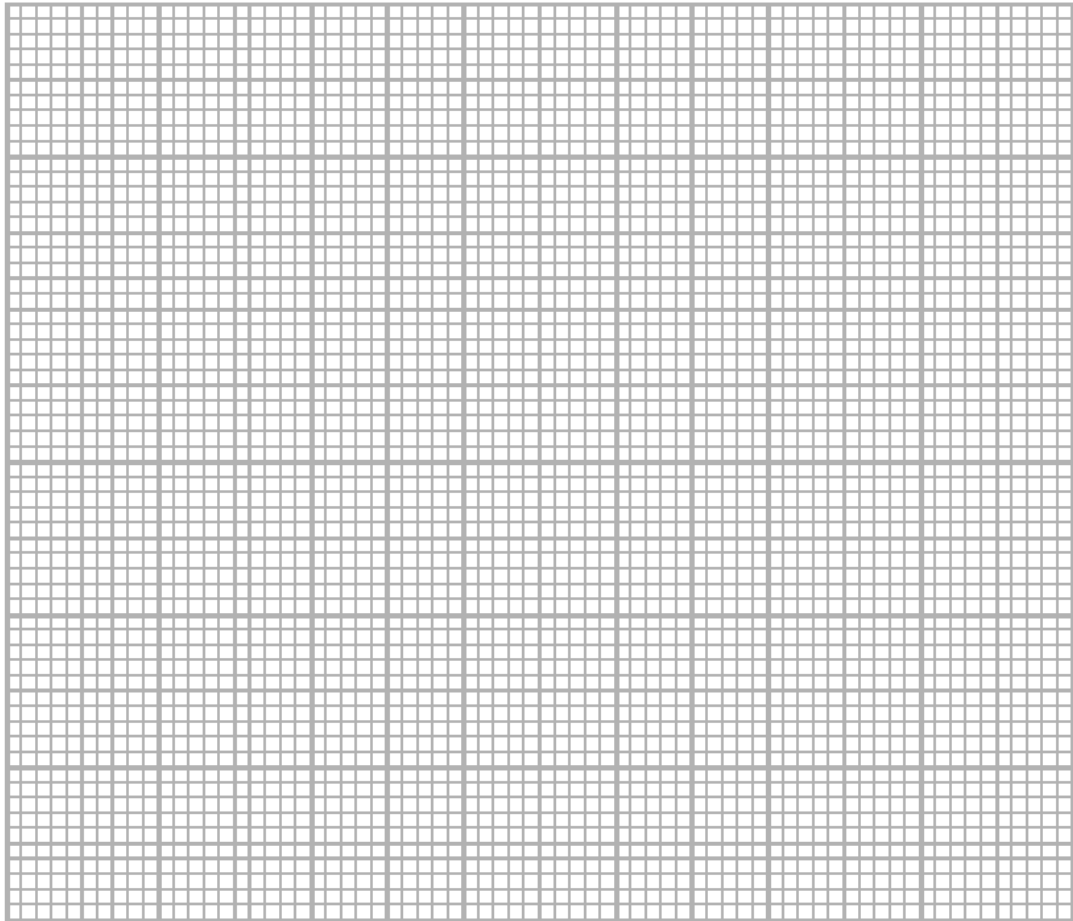
(Total for Question 1 is 3 marks)

2. The table shows the life expectancy (in years) for males born in the UK from 2000 to 2012.

Year of birth	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Life expectancy (years)	75.4	75.7	75.8	76.1	76.6	76.9	77.2	77.4	77.6	78.1	78.4	78.8	79.0

(Data from statistics.gov.uk)

(*a*) Use this information to predict the life expectancy of a male born in 2030.

(4)

(b) Make two comments explaining why your prediction in part (a) may not be reliable.

(2)

(Total for Question 2 is 6 marks)

3. Given that $A = 2^4 \times 3^3 \times 5$ and $B = 2^3 \times 3 \times 5^2$

write down, as a product of powers of its prime factors,

(i) the highest common factor (HCF) of A and B,

(ii) the lowest common multiple (LCM) of A and B.

(Total for Question 3 is 2 marks)

4. A rectangular piece of card *ABCP* is placed on a horizontal straight line.

The card is first rotated 90° clockwise about *C*.
The card is then rotated 90° clockwise about *B*.
The card is then rotated 90° clockwise about *A*.

Draw the locus of the vertex *P*.

(Total for Question 4 is 3 marks)

5.   (*a*) Solve the simultaneous equations $3x + 5y = 4$

                                                  $2x - y = 7$

(3)

(*b*) Find the integer value of *x* that satisfies both the inequalities

$$x + 5 > 8 \qquad \text{and} \qquad 2x - 3 < 7$$

(3)

(Total for Question 5 is 6 marks)

6. Modelling the planet Mercury as a sphere, it has a radius of 2440 km.

(*a*) (i) Work out an estimate in square kilometres for the surface area of Mercury.

(ii) Without carrying out a further calculation, give evidence to show whether your method gives you an underestimate or an overestimate for the surface area of Mercury.

(3)

In July 2013, the spacecraft Messenger was near Mercury at a distance of 9.75×10^7 km from Earth.

Taking the speed of light to be 3×10^8 m/s,

(*b*) work out how long it takes light to travel a distance of 9.75×10^7 km.
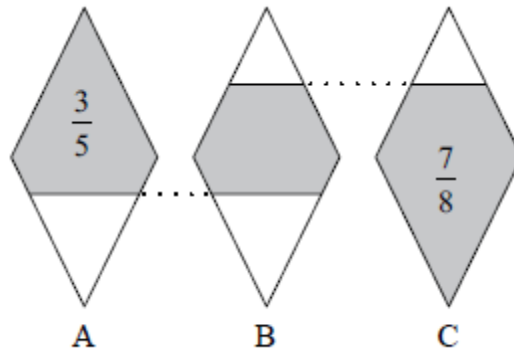
(3)

(Total for Question 6 is 6 marks)

7. The diagram shows three identical shapes A, B and C.

$\dfrac{3}{5}$ of shape A is shaded.

$\dfrac{7}{8}$ of shape C is shaded.

What fraction of shape B is shaded?

(Total for Question 7 is 3 marks)

8. On a farm, $4\frac{1}{2}$ out of every 15 acres of the land are used to grow crops.
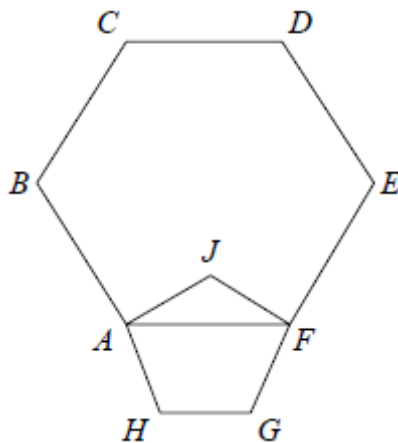
Wheat is grown on $\frac{5}{8}$ of the land used to grow crops.

What percentage of the total area of the land on the farm is used to grow wheat?

(Total for Question 8 is 3 marks)

9. *ABCDEF* is a regular hexagon.
AJFGH is a regular pentagon.

Work out the size of angle *BAJ*.

(Total for Question 9 is 4 marks)

10. Ishmael is a salesperson for a company.

His monthly wage is made up of his fixed basic wage plus commission.
His commission for a month is a fixed percentage of the sales he makes that month.

The table gives some information about his monthly wages.

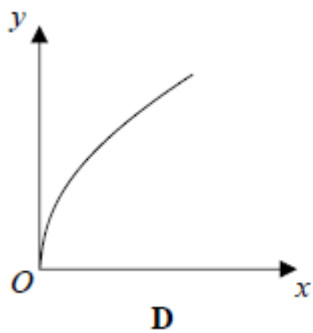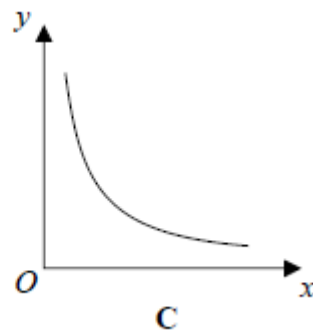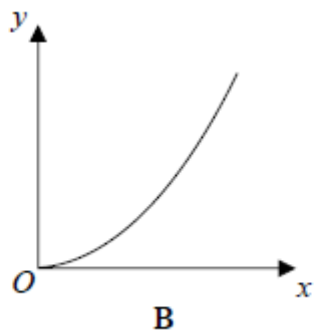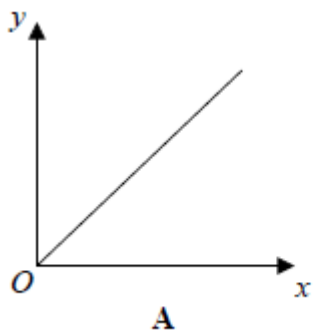| Month	Monthly wage	Sales (£)
June	1700	20 000
July	2200	30 000
August	2050	27 000

In September, Ishmael's monthly wage was £1850.

Work out his sales, in £, for September.

(Total for Question 10 is 4 marks)

11. Here are four graphs.

(a) Write down the letter of the graph that could represent

y is proportional to x^2.

(1)

(*b*) The force of attraction, *F* newtons, between two magnets varies inversely as the square of the distance, *d* cm, between the two magnets.

   (i) What happens to the force of attraction between the magnets when the distance between the magnets is doubled?

When the magnets are 3 cm apart the force of attraction between them is 40 newtons.

  (ii) What is the force of attraction between the magnets when they are 10 cm apart?

(5)

(Total for Question 11 is 6 marks)

12. The functions f and g are such that

$$f(x) = 1 - 5x \qquad \text{and} \qquad g(x) = 1 + 5x$$

(*a*) Show that gf(1) = – 19

(2)

(*b*) Prove that $f^{-1}(x) + g^{-1}(x) = 0$ for all values of *x*.

(3)

(Total for Question 12 is 5 marks)

13 A car has an initial speed of u m/s.

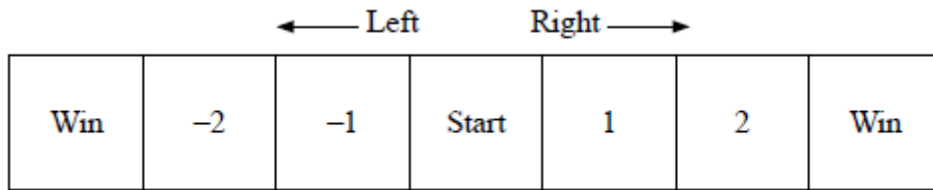The car accelerates to a speed of $2u$ m/s in 12 seconds.

The car then travels at a constant speed of $2u$ m/s for 10 seconds.

Assuming that the acceleration is constant, show that the total distance, in metres, travelled by the car is $38u$.

(Total for Question 13 is 4 marks)

14. Here is a board for a game.

← Left				Right →		
Win	−2	−1	Start	1	2	Win

Jim begins with a counter on **Start**.
He rolls a fair dice.

He moves his counter one square to the right when the dice lands on 1 or on 2 or on 3 or on 4.

Otherwise he moves his counter one square to the left.

Jim rolls the dice twice and moves his counter twice.

(*a*) Work out the probability that his counter will then be on the square with 2 on it.

(2)

Jim puts the counter back on the **Start** square.

He rolls the dice 3 times and moves his counter three times.

(*b*) Work out the probability that his counter will then be on the square with –1 on it.

(3)

Jim wins the game when his counter lands on a square with **Win** on it.

Jim says:
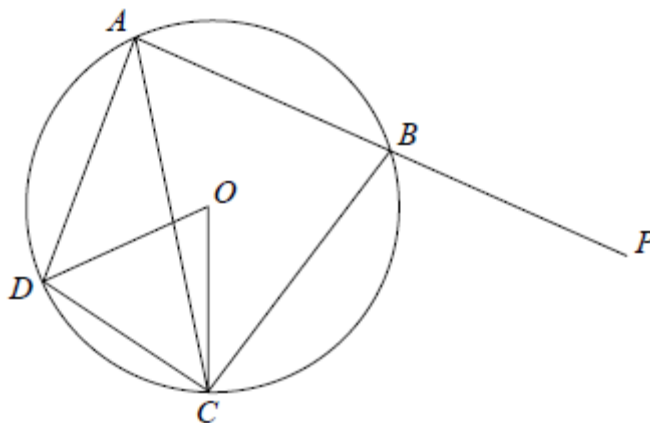
"I cannot win in an even number of throws of the dice."

(*c*) Explain whether or not Jim is correct.

(1)

(Total for Question 14 is 6 marks)

15.

A, *B*, *C* and *D* are four points on a circle, centre *O*.

PBA is a straight line.
Angle *PBC* = 100°.
Angle *DAC* = 23°.

Show that the size of angle *OCA* = 10°.
You must give a reason for each stage of your working.
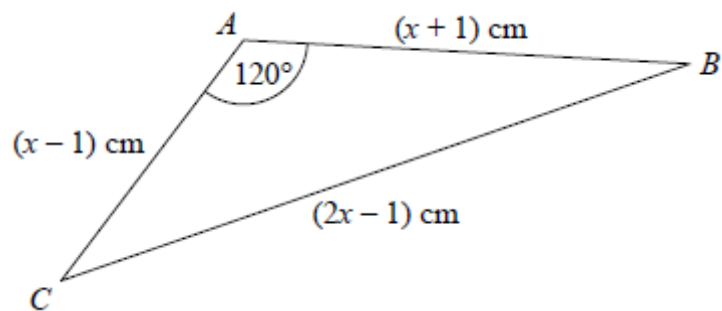
(Total for Question 15 is 6 marks)

16. (i) Sketch the graph of f(x) = $x^2 - 5x + 10$, showing the coordinates of the turning point and the coordinates of any intercepts with the coordinate axes.

(ii) Hence, or otherwise, determine whether f($x + 2$) $- 3 = 0$ has any real roots. Give reasons for your answer.

(Total for Question 16 is 6 marks)

17. The diagram shows triangle *ABC*.

The area of triangle *ABC* is $k\sqrt{3}$ cm².

Find the exact value of *k*.