

**Paper Reference 4MA1/1H**  
**Pearson Edexcel**  
**International GCSE**

Total Marks

**Mathematics A**  
**Paper 1H**  
**(Calculator)**  
**Higher Tier**

**Tuesday 7 January 2020 – Morning**

**Time: 2 hours plus your additional time allowance.**

**In the boxes below, write your name, centre number and candidate number.**

<b>Surname</b>					
<b>Other names</b>					
<b>Centre Number</b>					
<b>Candidate Number</b>					

**Y59756A**

**YOU MUST HAVE**

**Ruler, protractor, compasses, writing and drawing equipment, calculator. Tracing paper may be used.**

**YOU WILL BE GIVEN**

**Diagram Book  
Formulae Pages**

**Turn over**

## **INSTRUCTIONS**

**Answer ALL questions.**

**Without sufficient working, correct answers may be awarded no marks.**

**Answer the questions in the spaces provided in this Question Paper or on the separate diagrams – there may be more space than you need.**

**CALCULATORS MAY BE USED.**

**You must NOT write anything on the Formulae Pages. Anything you write on the Formulae Pages will gain NO credit.**

**Turn over**

**INFORMATION**

**The total mark for this paper is 100**

**The marks for EACH question are shown in brackets – use this as a guide as to how much time to spend on each question.**

**You may be provided with models for Question 15 and Question 19**

**They are NOT accurate.**

**There may be spare copies of some diagrams.**

**Turn over**

**ADVICE**

**Read each question carefully before you start to answer it.**

**Check your answers if you have time at the end.**

---

**Turn over**

**Answer all TWENTY TWO questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

1. The point **A** has coordinates **(5, −4)**  
The point **B** has coordinates **(13, 1)**

(a) Work out the coordinates of the  
midpoint of **AB**  
(2 marks)

( \_\_\_\_\_ , \_\_\_\_\_ )

(continued on the next page)

Turn over

1. continued.

Line **L** has equation

$$y = 2 - 3x$$

(b) Write down the gradient of line **L**  
(1 mark)

---

(continued on the next page)

Turn over



**1. continued.**

**Line L has equation**

$$y = 2 - 3x$$

**(c) Does the point with coordinates  
(100, −302) lie on line L?**

**You must give a reason for your  
answer.**

**(1 mark)**

---

---

---

---

---

**(Total for Question 1 is 4 marks)**

---

**Turn over**

- 2. Find the lowest common multiple (LCM) of 28 and 105**

**(2 marks)**

**Answer space continues on the next page.**

**2. continued.**

---

**(Total for Question 2 is 2 marks)**

---

**Turn over**

3. Look at the diagram for Question 3 in the Diagram Book.

It is NOT accurately drawn.

It shows a shape.

Four of the sides are marked: 9 cm, 12 cm, 6 cm and x cm

All marked angles are right angles.

The shape has area  $129 \text{ cm}^2$

Work out the value of x

(4 marks)

Answer space continues on the next page.

**3. continued.**

**X = \_\_\_\_\_**

**(Total for Question 3 is 4 marks)**

---

**Turn over**

- 4. Look at the table for Question 4 in the Diagram Book.**

**It shows information about the weights, in kilograms, of 40 babies.**

- (a) Write down the modal class.**

**(1 mark)**

---

**(continued on the next page)**

**Turn over**

**4. continued.**

**(b) Work out an estimate for the mean weight of the 40 babies.**

**(4 marks)**

**Answer space continues on the next page.**

**Turn over**

4. (b) continued.

\_\_\_\_\_ kg

(continued on the next page)

Turn over



**4. continued.**

**One of the 40 babies is going to be chosen at random.**

- (c) Find the probability that this baby has a weight of more than 5 kg**  
**(2 marks)**

---

**(Total for Question 4 is 7 marks)**

---

**Turn over**

5. **120** children go on an activity holiday.

The ratio of the number of girls to the number of boys is **3 : 5**

On Sunday, all the children either go sailing or go climbing.

**$\frac{16}{25}$**  of the boys go climbing.

Twice as many girls go sailing as go climbing.

(continued on the next page)

**5. continued.**

**Work out how many children go sailing on Sunday.**

**(6 marks)**

**Answer space continues on the next two pages.**

**Turn over**

**5. continued.**

**Turn over**

**5. continued.**

---

**(Total for Question 5 is 6 marks)**

---

**Turn over**

6. (a) Write

$$7.8 \times 10^{-4}$$

as an ordinary number.

(1 mark)

---

(continued on the next page)

Turn over

6. continued.

(b) Work out

$$\frac{5.6 \times 10^4 + 7 \times 10^3}{2.8 \times 10^{-3}}$$

Give your answer in standard form.

(2 marks)

---

(Total for Question 6 is 3 marks)

---

Turn over

7. (a) Expand and simplify

$$(m - 8)(m + 5)$$

(2 marks)

---

(continued on the next page)

Turn over



**7. continued.**

**(b) Factorise fully**

$$5y + 20y^2$$

**(2 marks)**

---

**(continued on the next page)**

**Turn over**

**7. continued.**

**(c) Simplify**

$$(p^2 + 3)^0$$

**(1 mark)**

---

**(continued on the next page)**

**Turn over**

**7. continued.**

**(d) Solve**

$$3(2x - 5) = \frac{9 - x}{2}$$

**Show clear algebraic working.**

**(4 marks)**

**Answer space continues on the  
next page.**

**Turn over**

7. (d) continued.

**X =** \_\_\_\_\_

**(Total for Question 7 is 9 marks)**

---

**Turn over**

8. Look at the diagram for Question 8 in the Diagram Book.

It shows shape **A** and shape **B** on a grid.

Describe fully the single transformation that maps shape **A** onto shape **B**

---

---

---

(Total for Question 8 is 2 marks)

---

9. Look at the diagram for Question 9 in the Diagram Book.

It is NOT accurately drawn.

It shows a right-angled triangle, **PRQ**

$$\mathbf{PR = 24.3 \text{ cm}}$$

$$\text{Angle } \mathbf{RPQ = 63^\circ}$$

Angle **PRQ** is a right angle.

Calculate the length of **PQ**

Give your answer correct to

**3** significant figures.

(3 marks)

Answer space is on the next two pages.

Turn over

9. continued.

Turn over

9. continued.

\_\_\_\_\_ cm

**(Total for Question 9 is 3 marks)**

---

**Turn over**



**10. Look at the diagram for Question 10 in the Diagram Book.**

**The shaded region in the diagram is bounded by three lines.**

**The equation of one of the lines is given.**

**Write down the three inequalities that define the shaded region.**

**(3 marks)**

**Answer space continues on the next page.**

**10. continued.**

---

---

---

**(Total for Question 10 is 3 marks)**

---

**Turn over**

**11. Max invests \$6000 in a savings account for 3 years.**

**The account pays compound interest at a rate of  $1 \cdot 5\%$  per year for the first 2 years.**

**The compound interest rate changes for the third year.**

**At the end of 3 years, there is a total of \$6311·16 in the account.**

**(continued on the next page)**

**11. continued.**

**Work out the compound interest rate  
for the third year.**

**Give your answer correct to  
1 decimal place.**

**(3 marks)**

**Answer space continues on the next  
page.**

11. continued.

\_\_\_\_\_ %

(Total for Question 11 is 3 marks)

---

Turn over

**12. Look at the diagram for Question 12 in the Diagram Book.**

**It shows a cumulative frequency graph.**

**A total of 80 men and women took part in a race.**

**The cumulative frequency graph gives information about the times, in minutes, they took for the race.**

**(continued on the next page)**

**12. continued.**

**(a) Use the graph to find an estimate  
for the interquartile range.**

**(2 marks)**

\_\_\_\_\_ minutes

**(continued on the next page)**

**Turn over**

**12. continued.**

**60% of the men took 50 minutes or less for the race.**

**No women took 50 minutes or less for the race.**

**(b) Work out an estimate for the number of men who took part in the race.**

**(3 marks)**

**Answer space continues on the next page.**

**Turn over**



**12. (b) continued.**

---

**(Total for Question 12 is 5 marks)**

---

**Turn over**

**13. Look at the diagram for Question 13 in the Diagram Book.**

**It is NOT accurately drawn.**

**It shows a solid cube with sides  $w$  cm**

**The cube is placed on a table so that the whole of one face of the cube is in contact with the table.**

**The cube exerts a force of 56 newtons on the table.**

**The pressure on the table due to the cube is  $0.14$  newtons/cm<sup>2</sup>**

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

**(continued on the next page)**

**Turn over**

**13. continued.**

**Work out the volume of the cube.**

**(4 marks)**

**Answer space continues on the next  
page.**

**Turn over**

**13. continued.**

\_\_\_\_\_  $\text{cm}^3$

**(Total for Question 13 is 4 marks)**

---

**Turn over**

**14. Look at the diagram for Question 14  
in the Diagram Book.**

**It is NOT accurately drawn.**

**It shows parallelogram EFGH**

$$\mathbf{EF = 9.3 \text{ cm}}$$

$$\mathbf{FG = 14.7 \text{ cm}}$$

$$\mathbf{\text{Angle EFG} = 106^\circ}$$

**(continued on the next page)**

**Turn over**

**14. continued.**

**(a) Work out the area of the  
parallelogram.**

**Give your answer correct to  
3 significant figures.**

**(2 marks)**

\_\_\_\_\_ **cm<sup>2</sup>**

**(continued on the next page)**

**Turn over**

**14. continued.**

**(b) Work out the length of the diagonal **EG** of the parallelogram.**

**Give your answer correct to 3 significant figures.**

**(3 marks)**

**Answer space continues on the next page.**

**Turn over**

**14. (b) continued.**

\_\_\_\_\_ **cm**

**(Total for Question 14 is 5 marks)**

---

**Turn over**



**15. Look at the diagram for Question 15 in the Diagram Book.**

**You may be provided with a model.**

**They are NOT accurate.**

**They show a cuboid of volume  $V \text{ cm}^3$  with length  $(2y + 5) \text{ cm}$ , width  $(3 - y) \text{ cm}$  and height  $(y + 1) \text{ cm}$**

**(a) Show that**

$$V = 15 + 16y - y^2 - 2y^3$$

**(3 marks)**

**Answer space is on the next two pages.**

**Turn over**

15. (a) continued.

Turn over

**15. (a) continued.**

**(continued on the next page)**

**Turn over**

**15. continued.**

**There is a value of  $y$  for which the volume of the cuboid is a maximum.**

**(b) Find this value of  $y$**

**Show your working clearly.**

**Give your answer correct to  
3 significant figures.**

**(5 marks)**

**Answer space continues on the  
next two pages.**

**Turn over**

**15. (b) continued.**

**Turn over**

15. (b) continued.

$y =$  \_\_\_\_\_

(Total for Question 15 is 8 marks)

---

Turn over

16. Given that  $P = \frac{55(2r - t)}{u}$

$r = 58.4$  correct to 3 significant figures.

$t = 20$  correct to 2 significant figures.

$u = 3.6$  correct to 2 significant figures.

Work out the upper bound for the value of  $P$

Show your working clearly.

Give your answer correct to 2 decimal places.

(3 marks)

Answer space is on the next two pages.

Turn over

16. continued.

Turn over



**16. continued.**

---

**(Total for Question 16 is 3 marks)**

---

**Turn over**

17. (a) Show that

$$(6 + 2\sqrt{12})^2 = 12(7 + 4\sqrt{3})$$

Show each stage of your working.

(3 marks)

Answer space continues on the next page.

Turn over

**17. (a) continued.**

**(continued on the next page)**

**Turn over**

**17. continued.**

**(b) Simplify fully**

$$\left( \frac{27f^{12}}{t^{15}} \right)^{-\frac{2}{3}}$$

**(3 marks)**

**Answer space continues on the  
next page.**

**Turn over**

**17. (b) continued.**

---

**(Total for Question 17 is 6 marks)**

---

**Turn over**

**18. There are 16 sweets in a bowl.**

**4 of the sweets are blackcurrant.**

**5 of the sweets are lemon.**

**7 of the sweets are orange.**

**Anna, Ravi and Sam each take at random one sweet from the bowl.**

**Work out the probability that the 5 lemon sweets are still in the bowl.**

**(4 marks)**

**Answer space continues on the next two pages.**

18. continued.

Turn over

**18. continued.**

---

**(Total for Question 18 is 4 marks)**

---

**Turn over**



19. Look at the diagram for Question 19 in the Diagram Book.

You may be provided with a model.

They are NOT accurate.

They show a cuboid **ABCDEFGH**

**$EH = 9 \text{ cm}$ ,**

**$HG = 5 \text{ cm}$  and**

**$ED = 6 \text{ cm}$**

Work out the size of the angle between **AH** and the plane **EFGH**

Give your answer correct to 3 significant figures.

(4 marks)

Answer space is on the next two pages.

Turn over

**19. continued.**

**Turn over**

**19. continued.**

○

---

**(Total for Question 19 is 4 marks)**

---

**Turn over**

**20. Look at the diagram for Question 20 in the Diagram Book.**

**The curve  $C$  has equation**

$$y = 4(x - 1)^2 - a \quad \text{where } a > 4$$

**(continued on the next page)**

**20. continued.**

**Using the axes in the Diagram Book,  
sketch the curve  $C$**

**On your sketch show clearly, in terms  
of  $a$ ,**

- (i) the coordinates of any points  
of intersection of  $C$  with the  
coordinate axes,**
- (ii) the coordinates of the  
turning point.**

**(Total for Question 20 is 4 marks)**

---

**Turn over**

21. The functions **f** and **g** are such that

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

$$g(x) = x + 3$$

The function **h** is such that

$$h(x) = fg(x) \text{ for } x \geq -2$$

Express the inverse function  $h^{-1}(x)$   
in the form

$$h^{-1}(x) = \dots$$

(5 marks)

Answer space is on the next three  
pages.

Turn over

**21. continued.**

**Turn over**

**21. continued.**

**Turn over**



21. continued.

$$h^{-1}(x) = \underline{\hspace{10cm}}$$

**(Total for Question 21 is 5 marks)**

---

**Turn over**

22. Triangle **HJK** is isosceles with  
**HJ = HK** and  **$JK = \sqrt{80}$**

**H** is the point with coordinates  **$(-4, 1)$**

**J** is the point with coordinates  **$(j, 15)$**   
where  **$j < 0$**

**K** is the point with coordinates  **$(6, k)$**

**M** is the midpoint of **JK**

The gradient of **HM** is **2**

Find the value of **j** and the value of **k**  
(6 marks)

Answer space is on the next five  
pages.

Turn over

**22. continued.**

**Turn over**

**22. continued.**

**Turn over**

**22. continued.**

**Turn over**

**22. continued.**

**Turn over**

**22. continued.**

**j = \_\_\_\_\_**

**k = \_\_\_\_\_**

**(Total for Question 22 is 6 marks)**

---

**TOTAL FOR PAPER IS 100 MARKS**

**END OF PAPER**

---