**Instructions**

**Time: 1 hour**

**4MA1/PP6H**

**Summer Exam Paper 2**

* 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.
* Without sufficient working, correct answers may be awarded no marks.
* Answer the questions in the spaces provided

– *there may be more space than you need*.

* **Calculators may be used.**
* You must **NOT** write anything on the formula page.

Anything you write on the formulae page will gain no credit.

**Information**

* The total mark for this paper is 60.
* 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.
* Check your answers if you have time at the end.

**Answer ALL fifteen questions.**

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

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

**1** Show that 

**(Total for Question 1 is 3 marks)**

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**2** (*a*) Use algebra to show that 

**(2)**

(*b*)Rationalise the denominator of 

Show each stage of your working.

Give your answer in the form ** where *a* and *b* are fractions in their simplest forms.

**(3)**

**(Total for Question 2 is 5 marks)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**3** Solve the simultaneous equations.

5*x* − 2*y* = 9.5

4*x* + 2*y* = 13

Show clear algebraic working.

*x* = .........................................

*y* = .........................................

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

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**4** In 2001, the population of India was 1028 million.

Between 1971 and 2001, the population of India increased by 87.6%

Work out the population of India in 1971.

Give your answer correct to the nearest million.

........................................................ million

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

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**5** The value of a boat depreciates by 16% each year.

At the end of 2012, the value of the boat is £65000.

Work out the value of the boat at the end of 2015.

£ ......................................................

**(Total for Question 5 is 3 marks)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**6**

The diagram shows a shape made from triangle *ABC* and a semicircle with diameter *BC*.

Triangle *ABC* is right-angled at *B*.

*AB* = 7.6 cm and *AC* = 9.5 cm.

Calculate the area of the shape.

Give your answer correct to 3 significant figures.

.......................................................cm2

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

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**7**

The diagram shows triangle *ACD*.

*B* is a point on *AC* and *E* is a point on *AD* so that *BE* is parallel to *CD*.

*AE* = 4 cm

*AC* = 11.7 cm

*BE* = 6 cm

*CD* = 13.5 cm

(*a*)Calculate the length of *AB*.

........................................................ cm

**(2)**

(*b*)Calculate the length of *ED*.

........................................................ cm

**(2)**

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

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**9** (*a*)Solve 

Show clear algebraic working.

*x* = .......................................................

**(3)**

(*b*)Make *p* the subject of the formula *t* = 

.......................................................

**(4)**

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

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**10**

*L*, *M* and *P* are points on a circle, centre *O*

Angle *LMP* = 48°

(*a*) (i) Write down the size of angle *LOP*

..........................................°

 (ii) Give a reason for your answer.

......................................................................................................................................................

......................................................................................................................................................

......................................................................................................................................................

**(2)**

*Q*, *R*, *S* and *T* are points on a circle.

*ATB* is the tangent to the circle at *T*

Angle *STR* = 26°

Angle *RQT* = 73°

(*b*) Work out the size of angle *STA*

 Give a reason for each stage in your working.

..........................................°

**(3)**

**(Total for Question 10 is 5 marks)**

**11** The diagram shows part of a sketch of the curve *y* = sin *x*°

(*a*) Write down the coordinates of

 (i) the point *P*

(............................... , ...............................)

 (ii) the point *Q*

(............................... , ...............................)

**(2)**

(*b*)Sketch the graph of *y* = tan *x* for 0° ⩽ *x* ⩽ 360°

 Show the coordinates of any points of intersection with the coordinate axes.

**(2)**

**(Total for Question 11 is 4 marks)**

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**12** Simplify 

Give your answer in the form *a* + *b* where *a* and *b* are integers.

Show your working clearly.

........................................................

 **(Total for Question 17 is 3 marks)**

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**13** The Venn diagram shows a universal set E and sets *A*, *B* and *C* where 6, 3, 7, 5, 2, 9, 4 and 8

represent **numbers** of elements.

(*a*)Find n(*A* ∪ *B*)ʹ

.......................................................

**(1)**

(*b*)Find n((*A* ∪ *C*)ʹ ∩ *B*)

.......................................................

**(1)**

(*c*)On the Venn diagram, shade the region that represents the set (*A* ∪ *B*) ∩ *C*

**(1)**

**(Total for Question 13 is 3 marks)**

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**14** The shape *OABC* is made from a triangle and a sector of a circle.

*OAB* is a triangle.

*OBC* is a sector of a circle, centre *O*.

*OA* = 12 cm

*AB* = 16 cm

Angle *OAB* = 60°

Angle *BOC* = 38°

Work out the area of *OABC*.

Give your answer correct to 3 significant figures.

....................................................... cm2

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

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**15 **

*v* = 27.3 correct to 3 significant figures.

*u* = 18 correct to 2 significant figures.

*a* = 9.81 correct to 3 significant figures.

Work out the lower bound for the value of *t*.

Show your working clearly.

Give your answer correct to 3 significant figures.

.......................................................

**(Total for Question 15 is 3 marks)**

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**TOTAL FOR PAPER: 60 MARKS**