

Surname <i>StemUp Model Solution</i>	Centre Number	Candidate Number
Other Names		0



GCSE

3300U10-1



MATHEMATICS
UNIT 1: NON-CALCULATOR
FOUNDATION TIER

FRIDAY, 10 NOVEMBER 2017 – MORNING

1 hour 30 minutes

ADDITIONAL MATERIALS

The use of a calculator is not permitted in this examination.
A ruler, protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

If you run out of space, use the continuation page at the back of the booklet. Question numbers must be given for all work written on the continuation page.

Take π as 3.14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

In question 9, the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	2	
2.	4	
3.	3	
4.	3	
5.	3	
6.	2	
7.	2	
8.	3	
9.	5	
10.	3	
11.	4	
12.	6	
13.	3	
14.	4	
15.	3	
16.	1	
17.	9	
18.	5	
Total	65	

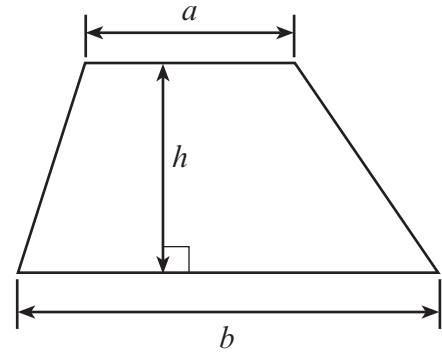
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Formula List - Foundation Tier

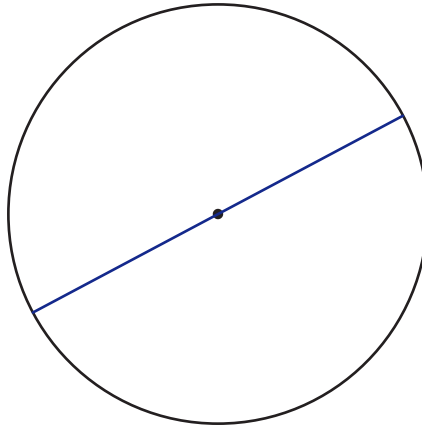
Area of trapezium $= \frac{1}{2} (a + b)h$



1. Each of these circles has its centre marked with • .

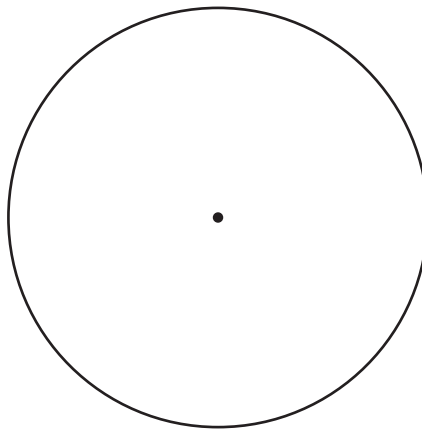
(a) Draw a diameter of this circle.

[1]



(b) Draw a tangent to this circle.

[1]



2. Write a number in each space to make these calculations correct.

[4]

(a)

$$325 + \underline{\quad 317 \quad} = 642$$

(b)

$$\underline{\quad 157 \quad} - 17 = 140$$

(c)

$$80 \div \underline{\quad 4 \quad} = 20$$

(d)

$$0.6 \times 100 = \underline{\quad 60 \quad}$$

Space for working:

$$(a) \quad 642 - 325 = 317$$

$$(b) \quad 140 + 17 = 157$$

$$(c) \quad 80 \div 20 = 4$$

$$(d) \quad 0.6 \times 100 = 60$$



3. Sam has a box with 30 coloured cards in it.
He chooses one card from the box at random.

- (a) There is an even chance that Sam chooses a red card.
How many red cards are there in Sam's box?

[1]

Even chance = half of 30 = $30 \div 2 = 15$

- (b) It is impossible for Sam to choose a yellow card.
How many yellow cards are there in Sam's box?

[1]

0 (impossible means there are none)

- (c) It is unlikely that Sam chooses a blue card.
What is the smallest number of blue cards that Sam could have in his box?

[1]

1 (at least one, but fewer than 15)

4. (a) Write down the mode of these numbers.

[1]

64 54 65 45 54 84 66 85

54 appears twice, every other number appears once

Mode = *54*

- (b) Write down the median of these numbers.

[2]

16 13 20 25 18 22 17 27 24

In order: 13, 16, 17, 18, 20, 22, 24, 25, 27

9 numbers, so the middle is the 5th number = 20

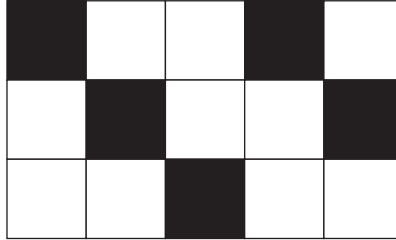
Median = *20*



5. (a) What fraction of the following diagram is shaded?

Write your answer in its simplest form.

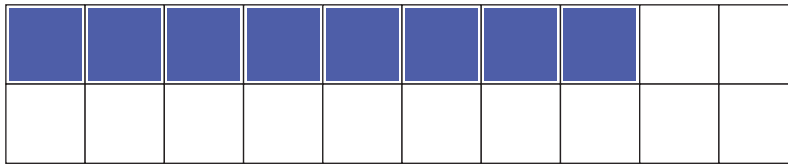
[2]



5 shaded out of 15 squares: $\frac{5}{15} = \frac{1}{3}$

- (b) Shade 40% of the following diagram.

[1]



40% of 20 squares = $0.4 \times 20 = 8$ squares



6. (a) The number 43 728 is to be written correct to the nearest thousand.
Circle the correct answer.

[1]

44 730

43 000

40 000

43 700

44 000

43 728 is between 43 000 and 44 000, $728 \geq 500$ so round up

- (b) One of these numbers is both a square number **and** a factor of 63.
Circle the correct answer.

[1]

3

21

9

16

7

$9 = 3 \times 3$ (square number) and $63 = 9 \times 7$

7. Work out the size of angle y .

[2]

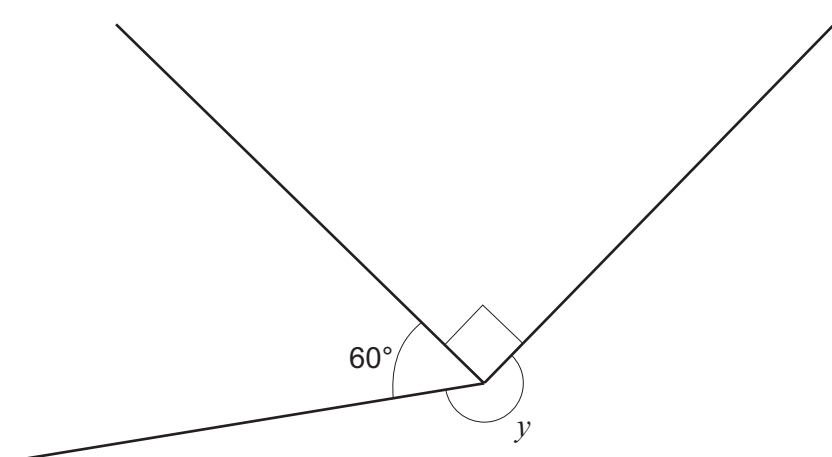


Diagram not drawn to scale

Angles around a point add up to 360°

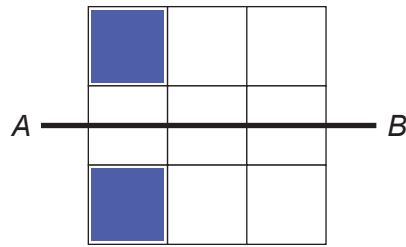
$$y = 360 - 60 - 90$$

$$y = 210$$

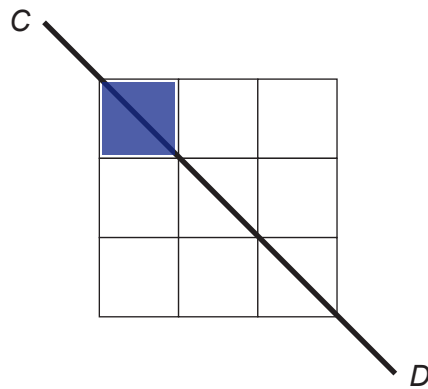
$$y = 210^\circ$$



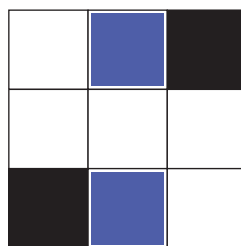
8. (a) Shade **exactly two** squares so that AB is the **only** line of symmetry for this diagram. [1]



- (b) Shade **exactly one** square so that CD is the **only** line of symmetry for this diagram. [1]



- (c) Shade **exactly two more** squares so that this diagram still has rotational symmetry of order 2. [1]



9. In this question, you will be assessed on the quality of your organisation, communication and accuracy in writing.

Rectangle A measures 25 cm by 8 cm.

Rectangle B is five times as long and five times as wide as rectangle A.

What is the perimeter of rectangle B?

You must show all your working.

[3 + 2 OCW]

Rectangle B is 5 times as long and 5 times as wide as A.

Length of rectangle B = $25 \times 5 = 125$ cm

Width of rectangle B = $8 \times 5 = 40$ cm

*Perimeter of rectangle B = $125 + 40 + 125 + 40$
 $= 330$ cm*

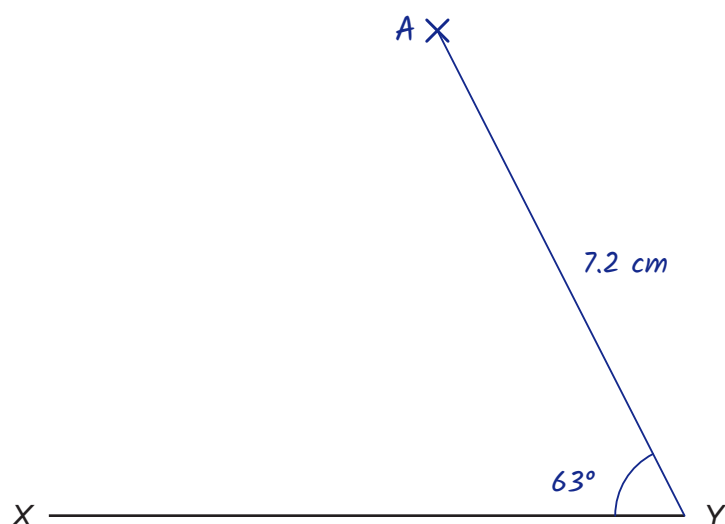
So the perimeter of rectangle B is 330 cm.



10. (a) On the diagram, mark the point A with a cross so that:

[2]

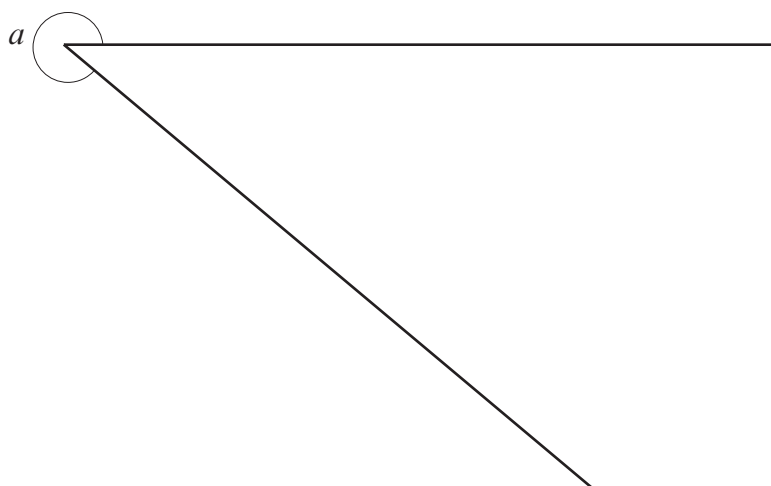
- $\widehat{XYA} = 63^\circ$, and
- $YA = 7.2 \text{ cm}$.



(b) Using a protractor, find the size of angle a .

[1]

Acute angle measured = 40° , so $a = 360^\circ - 40^\circ = 320^\circ$



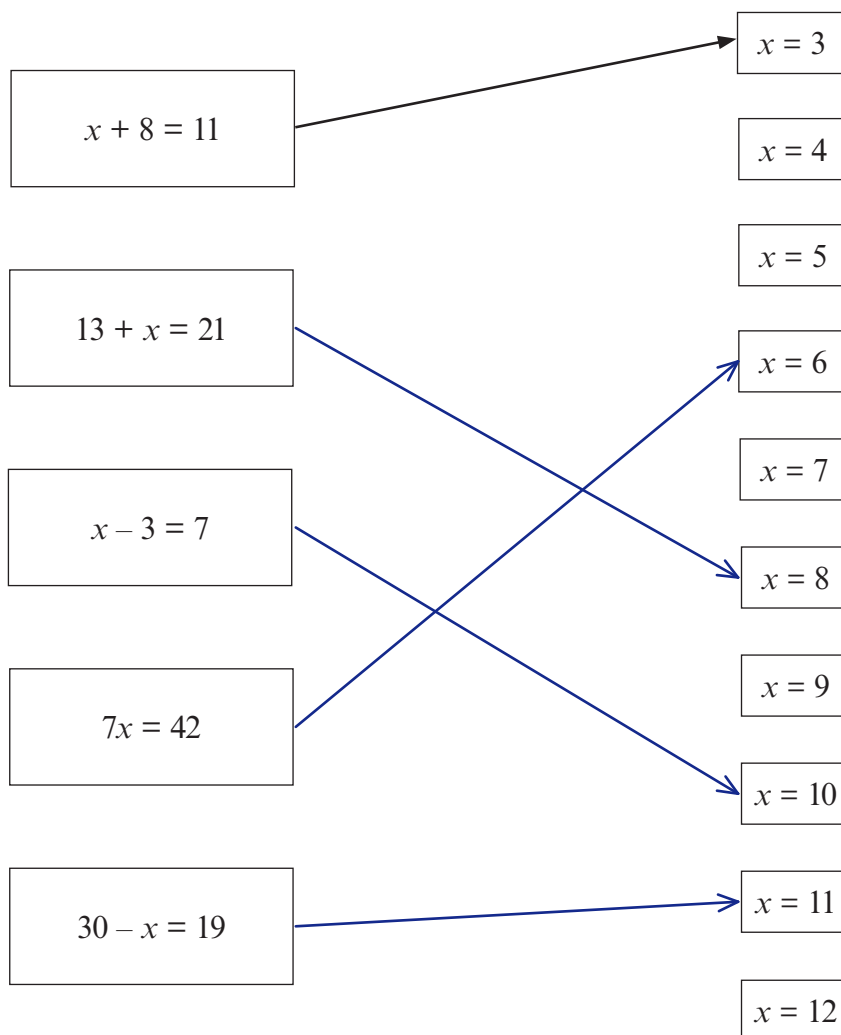
$a = 320^\circ$



11. Match each equation with its solution.

The first one has been done for you.

[4]



Space for working:

$$13 + x = 21 \rightarrow x = 21 - 13 = 8$$

$$x - 3 = 7 \rightarrow x = 7 + 3 = 10$$

$$7x = 42 \rightarrow x = 42 \div 7 = 6$$

$$30 - x = 19 \rightarrow x = 30 - 19 = 11$$



12. Calculate each of the following.

(a) $3^4 \times 10^3$ [2]

$$3^4 = 3 \times 3 \times 3 \times 3 = 81 \quad \text{and} \quad 10^3 = 1000$$

$$81 \times 1000 = 81\,000$$

(b) $5.6 - 3.82$ [1]

$$5.60$$

$$- 3.82$$

$$\underline{1.78}$$

$$5.6 - 3.82 = 1.78$$

(c) $\frac{5}{6} - \frac{2}{3}$ [2]

$$\frac{5}{6} - \frac{2}{3} = \frac{5}{6} - \frac{4}{6} = \frac{1}{6}$$

(common denominator 6)

(d) 0.2×0.3 [1]

$$2 \times 3 = 6, \text{ two decimal places in total}$$

$$0.2 \times 0.3 = 0.06$$



13. Circle either TRUE or FALSE for each of the following statements.

[3]

The expression $g \times g \times g$ can be written as $3g$	TRUE	<u>FALSE</u>
The expression $7y - y$ can be written as 7	TRUE	<u>FALSE</u>
$\frac{a}{4} \div a = \frac{1}{4}$	<u>TRUE</u>	FALSE
$\frac{a}{2} + \frac{a}{2} = a$	<u>TRUE</u>	FALSE
When $a = 1$, $b = 2$ and $c = 3$, $a + b + c = abc$	<u>TRUE</u>	FALSE

Space for working:

$$g \times g \times g = g^3, \text{ not } 3g$$

$$7y - y = 6y, \text{ not } 7$$

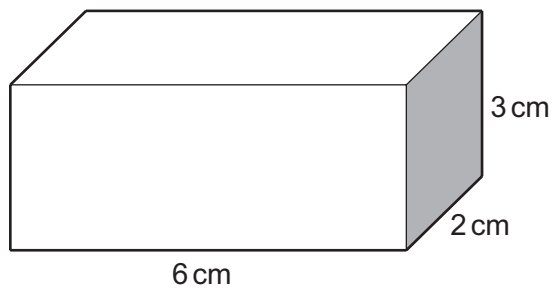
$$\frac{a}{4} \div a = \frac{a}{4} \times \frac{1}{a} = \frac{1}{4}$$

$$\frac{a}{2} + \frac{a}{2} = \frac{2a}{2} = a$$

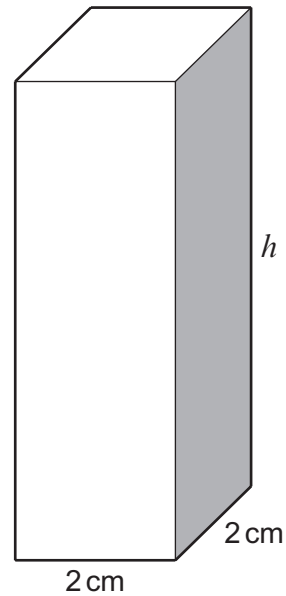
$$a + b + c = 1 + 2 + 3 = 6 \quad \text{and} \quad abc = 1 \times 2 \times 3 = 6$$



14. The two cuboids shown below have equal volumes.



Cuboid A



Cuboid B

Diagrams not drawn to scale

Calculate the height h of Cuboid B.
You must show all your working.

[4]

$$\text{Volume of cuboid A} = 6 \times 3 \times 2 = 36 \text{ cm}^3$$

$$\text{Volume of cuboid B} = 2 \times 2 \times h = 4h$$

$$\text{Volumes are equal: } 4h = 36$$

$$h = 36 \div 4$$

$$h = 9 \text{ cm}$$



15. A fraction is written as $\frac{a}{b}$.

- The fraction is a multiple of 0.2.
- The fraction is greater than $\frac{1}{2}$.
- The fraction is less than 75%.

Write down the fraction as $\frac{a}{b}$, where a and b are whole numbers.

[3]

Multiples of 0.2: 0.2, 0.4, 0.6, 0.8, 1, ...

$1/2 = 0.5$ and $75\% = 0.75$

$0.5 < 0.6 < 0.75$, so the fraction is 0.6

$0.6 = 6/10 = 3/5$

Answer = $\frac{3}{5}$

16. Expand $5(3x - 2)$.

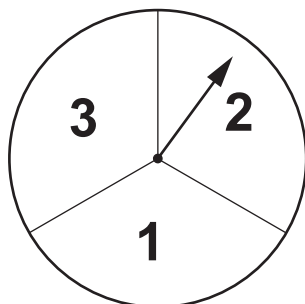
[1]

$5 \times 3x - 5 \times 2 = 15x - 10$

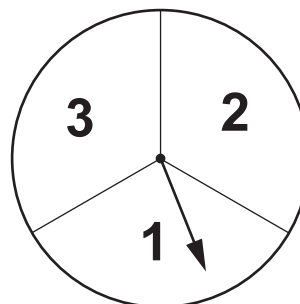


17. Sara is in charge of a game at her school's Christmas party.

Two fair spinners are spun as shown in the example below.



1st Spinner



2nd Spinner

People can make a two-digit number using the numbers shown on the spinners using the following rule:

Multiply the number on the first spinner by 10 and then add the number on the second spinner.

One example, as shown above, makes the number 21, because $2 \times 10 + 1 = 21$.

- (a) How many different numbers can be made playing this game? [1]

11, 12, 13, 21, 22, 23, 31, 32, 33 ($3 \times 3 = 9$)

9 different numbers

- (b) Write down all the prime numbers that can be made playing this game. [2]

11, 13, 23, 31

(12, 21, 22, 32, 33 are not prime)

- (c) What is the probability that a person makes a prime number when playing the game once? [2]

4 primes out of 9 equally likely numbers

$P(\text{prime}) = \frac{4}{9}$



- (d) Sara charges each person £1 to play the game once.
Each player who makes a prime number from their spins wins £2.
How much profit would the school expect to make when 180 people play the game? [4]

$$\text{Expected number of winners} = \frac{4}{9} \times 180$$

$$180 \div 9 = 20, \quad 20 \times 4 = 80 \text{ winners}$$

$$\text{Money taken} = 180 \times £1 = £180$$

$$\text{Money paid out} = 80 \times £2 = £160$$

$$\text{Expected profit} = £180 - £160 = £20$$

The school would expect to make £20 profit.



18. $ABCD$ is a quadrilateral.

$\angle ABC = 93^\circ$, $\angle BCD = 122^\circ$ and $\angle ADC = 85^\circ$.

Points P and Q lie on the quadrilateral as shown, such that $AP = AQ$.

Prove that triangle APQ is an equilateral triangle.

You must show all your working.

[5]

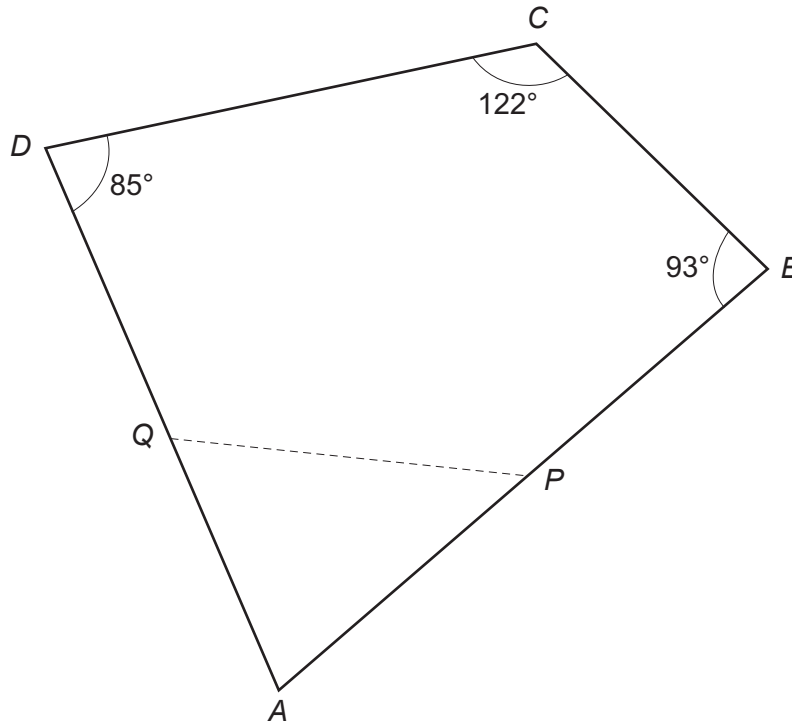


Diagram not drawn to scale

Angles in a quadrilateral add up to 360° .

Angle $BAD = 360^\circ - (93^\circ + 122^\circ + 85^\circ)$

$= 360^\circ - 300^\circ = 60^\circ$, so angle $PAQ = 60^\circ$.

$AP = AQ$, so triangle APQ is isosceles and angle $APQ = \text{angle } AQP$.

Angle $APQ = \text{angle } AQP = (180^\circ - 60^\circ) \div 2 = 120^\circ \div 2 = 60^\circ$

So all three angles of triangle APQ are 60° .

All the angles are equal, so triangle APQ is equilateral.

END OF PAPER



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