

QUIZ PAGE 9 with answers. KS3KS4 (ages 11-16)

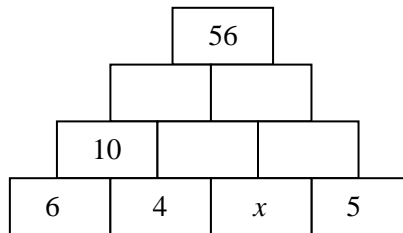
1. A rectangular carpet has perimeter 24m and area 20m^2 .
The lengths of the sides of the rectangular carpet are:

A. 6 and 6 B. 10 and 2 C. 8 and 4 D. 9 and 3 E. 12 and 1

2. The value of $\frac{3 \times 5 \times 7 \times 9}{1+2+3+4+5+6+7+8+9}$ is:

A. 21 B. 15 C. 1 D. 10 E. 27

3. In the diagram shown, the number 10 is obtained by adding the two numbers directly below (6 and 4). The other numbers in the top three rows can also be obtained in the same way. The value of x is:

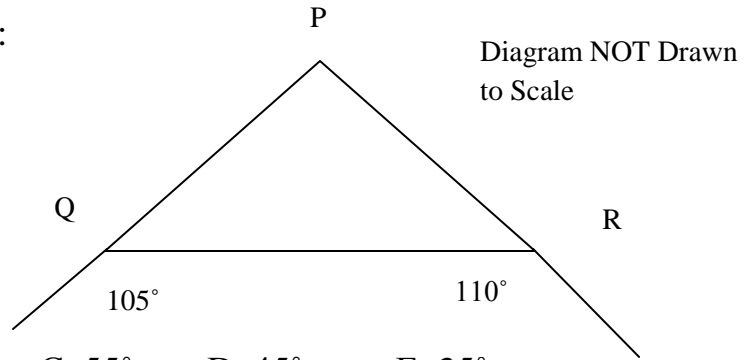


A. 10 B. 12 C. 11 D. 13 E. 2.24

4. A three-digit number is exactly divisible by 8, 12 and 15.
The smallest possible number (LCM) is:

A. 240 B. 360 C. 180 D. 120 E. 1440

5. The size of angle QPR is:



- A. 145° B. 25° C. 55° D. 45° E. 35°

6. The next number in the sequence 2, 3, 6, 15, 42, ... is:

- A. 162 B. 135 C. 58 D. 123 E. 148

7. 100 dots, numbered 1 to 100, are evenly spaced on the circumference of a circle. Dot 100 is opposite dot 50. Which dot is opposite dot 78?

- A. 25 B. 26 C. 27 D. 28 E. 29

8. 1000 dots, numbered 1 to 1000 are evenly spaced on the circumference of a circle. Dot 1000 is opposite dot 500. Which dot is opposite dot 654?

- A. 154 B. 153 C. 155 D. 156 E. 152

9. The mean (average) of 30 numbers is 30.

21 of these numbers have a mean of 21. The average of the remaining 9 numbers is:

- A. 50 B. 1 C. 51 D. 81 E. 49

10. The mean (average) of 50 numbers is 50.

30 of these numbers have a mean of 30. The average of the remaining 20 numbers is:

- A. 50 B. 60 C. 70 D. 80 E. 90

11. Which of the fractions below lies between $\frac{1}{2}$ and $\frac{2}{3}$?

- A. $\frac{1}{3}$ B. $\frac{1}{4}$ C. $\frac{19}{24}$ D. $\frac{7}{12}$ E. $\frac{3}{4}$

12. Which of the fractions below lies between $\frac{2}{3}$ and $\frac{3}{4}$?

- A. $\frac{4}{5}$ B. $\frac{17}{24}$ C. $\frac{19}{24}$ D. $\frac{7}{12}$ E. $\frac{16}{24}$

13. What is the units (ones) digit of the answer to

$$1^{2012} + 5^{2012} + 6^{2012} + 9^{2012}$$

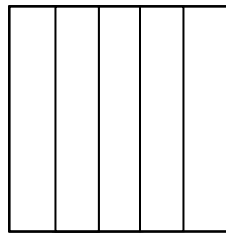
- A. 1 B. 2 C. 3 D. 4 E. 5

14. What is the answer to $2^{2012} - 2^{2011} - 2^{2010} - 2^{2009}$?

- A. 2^{2012} B. 2^{2010} C. 0 D. 1 E. 2^{2009}

15. A square is divided into 5 identical rectangles each of perimeter 48cm.

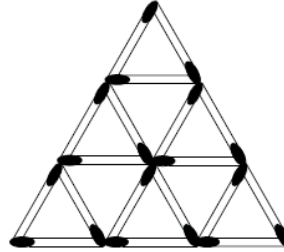
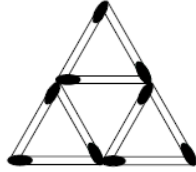
The perimeter of the square, in cm, is:



- A. 80 B. 400 C. 82 D. 160 E. 84

BONUS QUESTION: GROUP WORK (use of calculator allowed)

The following shapes are made from matchsticks of equal length.



Shape 1

2

3

- (a) How many matchsticks are needed to make shape 4?
- (b) How many matchsticks are needed to make shape 10?
- (c) How many matchsticks are needed to make shape 24?
- (d) Which shape number was made from 630 matchsticks?
- (e) Which shape number was made from 1395 matchsticks?

ANSWERS/SOLUTIONS (solutions not unique).

1. $l + w = 24 \div 2 = 12$, $lw = 20$, $10 + 2 = 12$, $10 \times 2 = 20$.

Hence, **B**

2. $\frac{3 \times 5 \times 7 \times 9}{5 \times 9} = 3 \times 7 = 21$, **A**

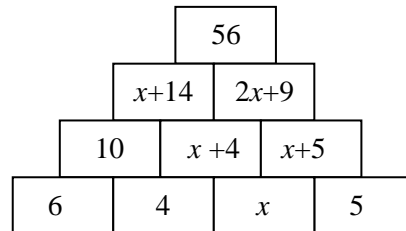
NOTE: in the denominator, pair the numbers that add up to 9: 1+8, 2+7, 3+6, 4+5,

3. $x + 14 + 2x + 9 = 56$

$$3x = 56 - 23$$

$$3x = 33$$

$$x = 11$$
 C



4. Use prime factors: $8 = 2^3$, $12 = 2^2 \times 3$ and $15 = 3 \times 5$.

$$\text{LCM} = 2^3 \times 3 \times 5 = 8 \times 3 \times 5 = 40 \times 3 = 120$$
 D

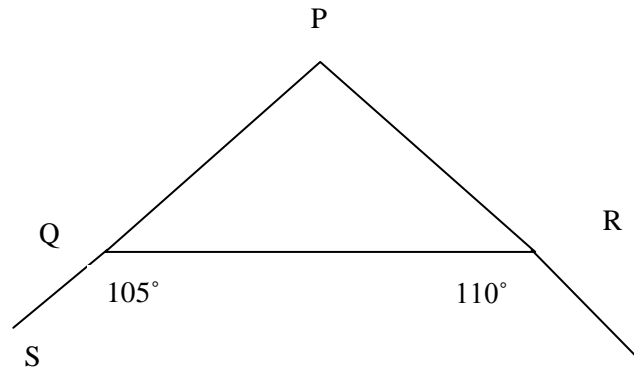
5. Angle QRP = $180 - 110 = 70^\circ$

Angle PQR = $180 - 105 = 75^\circ$

Hence,

$$\text{angle QPR} = 180 - (75 + 70)$$

$$= 35^\circ$$
 E



OR angle QRP = 70° and using the exterior angle property,

$$\text{Angle SQR} = \text{QPR} + \text{QRP} \quad 105 = \text{angle QPR} + 70$$

6. 2, 3, 6, 15, 42, $(42 + 81) = 123$ **D**

$$1 \quad 3 \quad 9 \quad 27 \quad 81$$

Difference: $1, 1 \times 3 = 3, 3 \times 3 = 9, 9 \times 3 = 27, 27 \times 3 = 81$

7. Two Dots are always 50 apart. $78 - 50 = 28$. **D.**

8. Two Dots are always 500 apart. $654 - 500 = 154$. **A**

9. The sum of 30 numbers = $30 \times 30 = 900$.

The sum of 21 numbers = $21 \times 21 = 441$

Hence, sum of 9 numbers = $900 - 441 = 459$

Hence, mean of 9 numbers = $459 \div 9 = 51$. **C**

OR $\frac{30^2 - 21^2}{9} = \frac{(30+21)(30-21)}{9} = \frac{51 \times 9}{9} = 51$ **C**

10. As in question 9, the mean of remaining 20 numbers

$$= \frac{50^2 - 30^2}{20} = \frac{(50+30)(50-30)}{20} = \frac{80 \times 20}{20} = 80. \quad \mathbf{D}$$

11. $\frac{1}{2} = \frac{6}{12}$ and $\frac{2}{3} = \frac{8}{12}$, hence, $\frac{7}{12}$ **D**

12. $\frac{2}{3} = \frac{16}{24}$ and $\frac{3}{4} = \frac{17}{24}$ hence, $\frac{17}{24}$ **B**

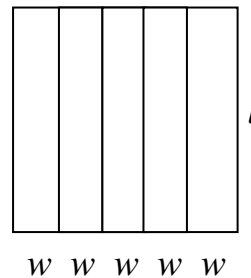
13. $1^{2012} = 1$, 5^{2012} ends in 5, 6^{2012} ends in 6,
 $9^{2012} = (9^2)^{1006}$, 9^2 ends in 1, hence, $(9^2)^{1006}$ ends in 1.

Hence, units digit of $1^{2012} + 5^{2012} + 6^{2012} + 9^{2012}$ depends on the units digit of $1 + 5 + 6 + 1 = 13$, which is 3. **C**

14. $2^{2012} - 2^{2011} - 2^{2010} - 2^{2009}$
 $= 2^{2009} (2^3 - 2^2 - 2 - 1) = 2^{2009} (8 - 4 - 2 - 1) = 2^{2009} (1) = 2^{2009}$

E

15. Let the length of each rectangle (and hence, the square) be l and the width be w as shown .



Hence, $l = 5w$.

The perimeter of each rectangle is 48, hence, $l + w = 48 \div 2 = 24$.

But $l = 5w$, hence, $6w = 24$, $w = 4$, and hence, $l = 5 \times 4 = 20$.

Hence, the perimeter of the square = $4l = 4 \times 20 = 80$. **A**

BONUS QUESTION: Use of calculator allowed.

	Shape Number	Number of matchsticks	Observations
	1	3	1 x3 = 3
	2	9	3 x3 = 9
	3	18	6 x3 = 18
(a)	4	30	10 x3 = 30
(b)	10	165	$\frac{10(10 + 1) \times 3}{2} = \frac{10 \times 11 \times 3}{2}$ $= 165$
(c)	24	900	$\frac{24(24 + 1) \times 3}{2} = \frac{24 \times 25 \times 3}{2}$ $= 900$
(d)	20	630	$\frac{3n(n + 1)}{2} = 630$ $n(n + 1) = (630 \div 3) \times 2 = 420$ <p>Or</p> $n(n + 1) = (630 \times 2) \div 3 = 420$ $\sqrt{420} \approx 20. \quad n = 20.$ <p>Check:</p> $\frac{20(20 + 1) \times 3}{2} = \frac{20 \times 21 \times 3}{2}$ $= 630$
(e)	30	1395	Use a similar method to (d)
	n	$\frac{3n(n + 1)}{2}$	1, 3, 6, 10, ... are triangular numbers $\text{nth term} = \frac{n(n+1)}{2}$

I hope you find this useful and challenging. If you find any errors, please let me know. Thank you.