ONLINE ROUND

MATHEMATICS CHALLENGE

AGE CATEGORY: FAIRY BEE (12-13 YEARS OLD)

Maths Topics for Fairy Bee: 12-13 Years Old

Mathematics Knowledge Test will assess the following topics:

Number: Understanding and using numbers and number relationships, including integers, fractions, decimals, and percentages. Applying concepts of addition, subtraction, multiplication, and division.

Algebra: Understanding and using algebraic concepts and notation, including properties of integers, expressions, equations, formulae, and functions.

Ratio, proportion, and rates of change: Understanding and using concepts of ratio, proportion, and rates of change, including solving problems involving these concepts.

Geometry and measures: Understanding and using concepts of geometry, including points, lines, angles, shapes, and symmetry, and understanding and using standard units of measure, including length, area, volume, weight, and time. Understanding and using concepts of coordinate geometry such as graphing points on the coordinate plane, using coordinates to prove geometric theorems.

Statistics: Understanding and using concepts of statistics, including collecting, representing, and interpreting data using tables, graphs, and probability, and understanding and using concepts of probability.

Problem-solving: Using mathematical concepts and skills to solve problems in a variety of contexts.

Number system and number theory: Understanding and using concepts of number systems, number theory and number properties, including prime numbers, factors, multiples and primes

Trigonometry: Understanding and using concepts of trigonometry, such as the unit circle, as right triangle trigonometry, and trigonometric functions, sine, cosine and tangent

1. What is the value of $1.5 - \frac{2}{5} + \frac{1}{10}$?

   A. 0.1
   B. 0.5
   C. 1
   D. 1.2

2. Today is Saturday. What day will it be in 80 days' time?

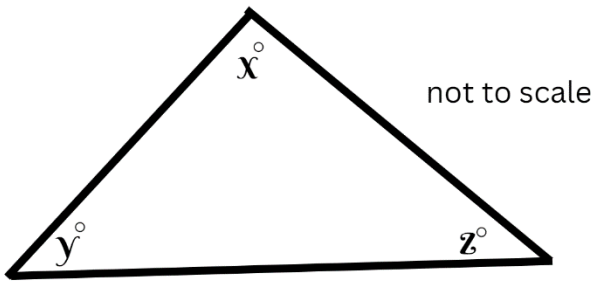
   A. Monday
   B. Tuesday
   C. Wednesday
   D. Thursday

3. Half of a fifth of a tenth of a number is equal to $\frac{1}{10} + \frac{3}{5}$.

   What is half of the number?

   A. 5
   B. 35
   C. 50
   D. 75

4. In the triangle, the mean of angles $\boldsymbol{x}$ and $\boldsymbol{y}$ is twice the value of $\boldsymbol{z}$.



What is the value of $\boldsymbol{z}$?

A. 36°
B. 60°
C. 72°
D. 80°

5. A square has the same area as a circle.
The radius of the circle is given by r.

What is the side of the square?

A. πr
B. $\pi\sqrt{r}$
C. $\sqrt{\pi}\, r$
D. $\sqrt{\pi r}$

6. When I have walked 10% of the way to school, I have 1800 metres more to walk than when I have 10% of the walk remaining.

How far, in metres, is it from my home to my school?

A. 1225
B. 1250
C. 2250
D. 2275

7. What is the value of $1 - 4 \times 5 + 2 \div 5$?

   A. -18.6
   B. -2.6
   C. -15
   D. -10

8. Ahmed thinks of a number. He doubles it, adds 9,
   divides his answer by 3 and finally subtracts 1.
   He obtains the same number he orginally thought of.

   What was Ahmed's number?

   A. 6
   B. 4
   C. 3
   D. 2

9. Which one of the following four numbers is not prime number?

   A. 103
   B. 107
   C. 109
   D. 111

10. Julie is 91 years old. In Julie's lifetime, how many times has her age in years changed from a square number to a prime number?

    A. 1
    B. 2
    C. 3
    D. 4

11. Four different positive integers have a product of 110.
    What is the sum of the four integers?

    A. 19
    B. 22
    C. 24
    D. 25

12. John has eaten two fifths of the grapes.

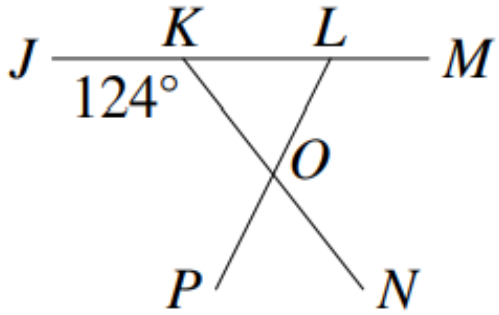
    What is the ratio of the number of grapes that remain to the number John has eaten?

    A. 2:5
    B. 3:5
    C. 3:2
    D. 2:3

13. On Jasmine's 16th birthday, David was three times her age. On Jasmine's 21st birthday, how old was David?

A. 32
B. 48
C. 53
D. 63

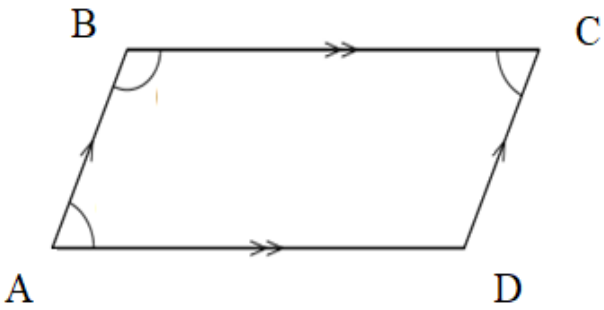
14. In the diagram, angle PON is half of angle OLM.



What is the size of angle OLM?

A. 101°
B. 110°
C. 111°
D. 112°

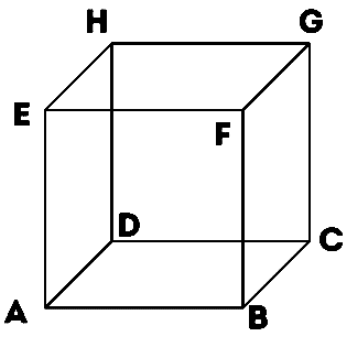
15. ABCD is a parallelogram. Angle A is given by $4x - 25$, angle B is given by $x - 20$ and angle D is given by $y - 25$.



What is the value of y?

A. 22
B. 50
C. 32
D. 40

16. A triangular pyramid with vertices A, B, C and F is removed from the solid cube shown.



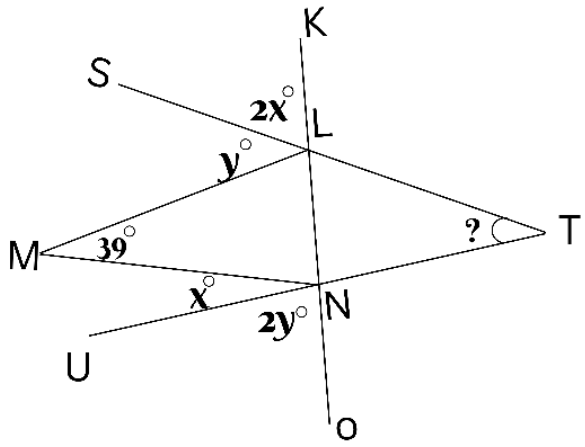
How many more edges does the remaining solid have than the original solid cube?

A. 0
B. 1
C. 2
D. 3

17. In the diagram, KLNO, SLT and UNT are straight lines.

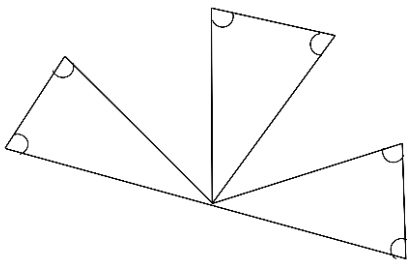
How many degrees is angle LTN?

A. 34°
B. 35°
C. 36°
D. 37°

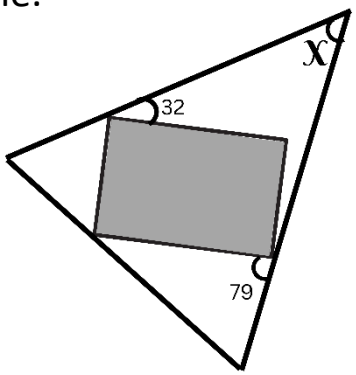


18. What is the sum of the marked angles?

A. 180
B. 270
C. 432
D. 540



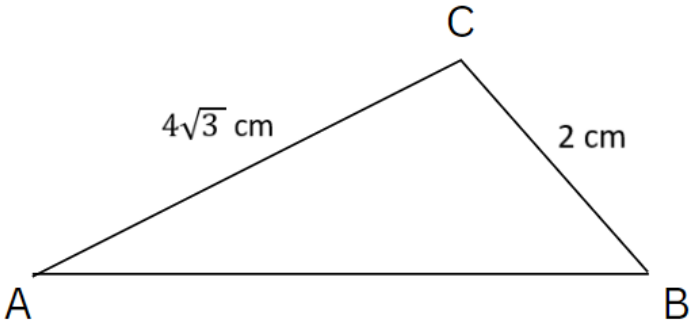
19. The diagram shows a rectangle inside a triangle.



What is the size of angle is x?

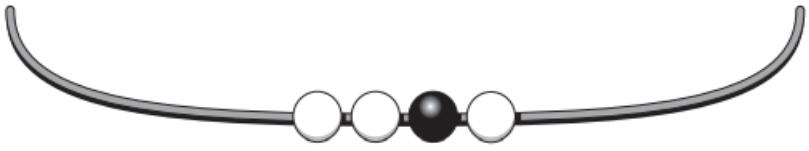
A. 57
B. 47
C. 37
D. 27

20. Triangle ABC has an obtuse angle at C.
Given that $\sin A = \frac{1}{4}$,
what is the value of angle B?



A. 40°
B. 50°
C. 60°
D. 70°

21. Look at the necklace below. How many more black beads and white beads do you need to add to make the ratio of black to white 3 : 2?

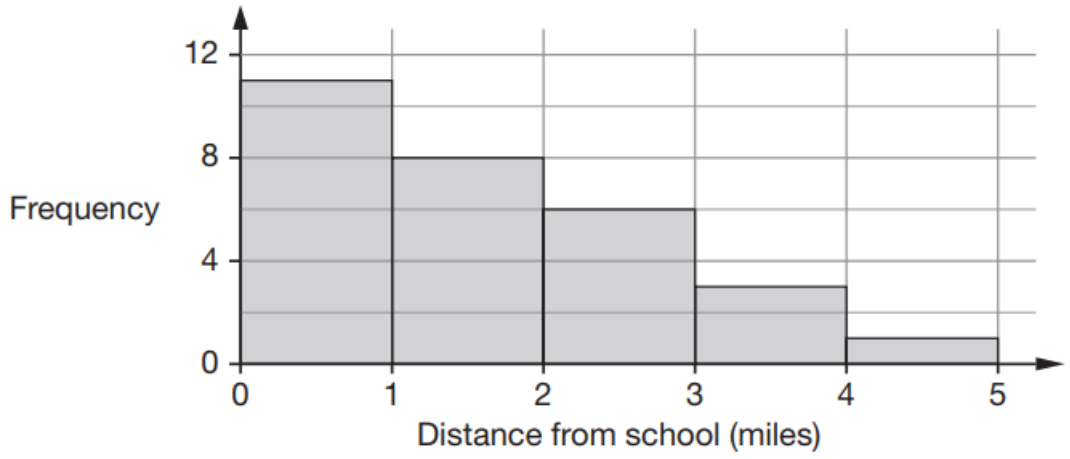


A. One black bead
B. One white bead, 5 black beads
C. Five white beads, one black bead
D. Three white beads, two black beads

22. I have two fair four-sided dice.
The dice are both numbered 3, 4, 5 and 6
I am going to roll both dice and multiply the scores.
What is the probability that the product is a multiple of 3?

A. 25%
B. 40%
C. 60%
D. 75%

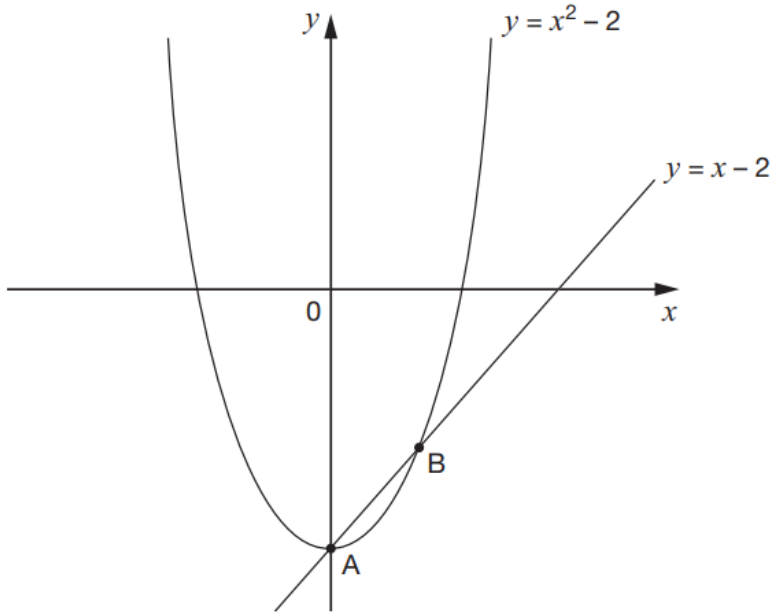
23. Pupils in a class investigated how far they live from school.
The frequency diagram shows the results.



Which one below could be the median distance from school?

A. 1 mile
B. 1.5 miles
C. 2 miles
D. 2.5 miles

24. Look at the graph. necklace below.



At points A and B, $y = x - 2$ and $y = x^2 - 2$
What are the coordinates of A and B?

A. A = (0 , -1) B = (-1 , 1)
B. A = (2 , 0) B = (1 , -1)
C. A = (0 , -2) B = (1 , -1)
D. A = (-2 , 0) B = (1 , -1)

25. A cyclist went 1km up a hill at 15km per hour.
Then she went 1km down the hill at 30km per hour.
What was her average speed for the 2km?

A. 20 km/h
B. 22.5 km/h
C. 25 km/h
D. 30 km/h