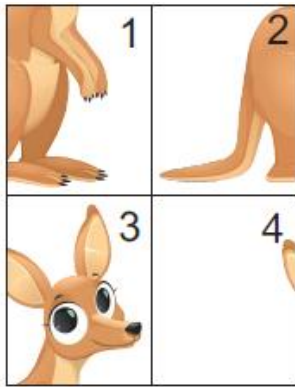# Math Kangaroo 2020 Sample Questions

LEVELS 1 AND 2

SAMPLE QUESTION FOR 3 POINTS

3. Nelly arranged the 4 pieces to make a picture of a kangaroo. How are the pieces arranged?

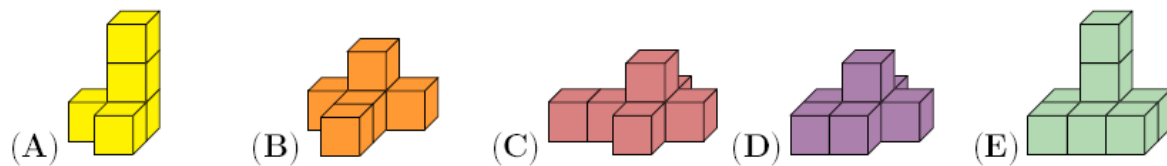(A) | 4 3 / 2 1   (B) | 3 4 / 2 1   (C) | 2 1 / 4 3   (D) | 4 3 / 1 2   (E) | 3 4 / 1 2

SAMPLE QUESTION FOR 4 POINTS

11. Five shapes are made by gluing cubes together face to face. Which shape uses the most cubes?

(A)   (B)   (C)   (D)   (E)

SAMPLE QUESTION FOR 5 POINTS

19. Mark the Bee can walk only on gray cells. In how many ways can you color exactly two white cells gray so that Mark can walk from A to B?
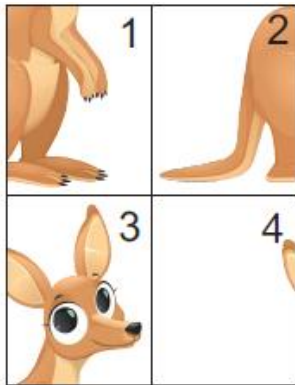

(A) 3   (B) 4   (C) 5   (D) 6   (E) 7

Math Kangaroo 2020 Sample Questions

LEVELS 1 AND 2 ANSWERS

SAMPLE QUESTION FOR 3 POINTS

3. Nelly arranged the 4 pieces to make a picture of a kangaroo. How are the pieces arranged?

4	3
2	1

(A)

3	4
2	1

(B)

2	1
4	3

(C)
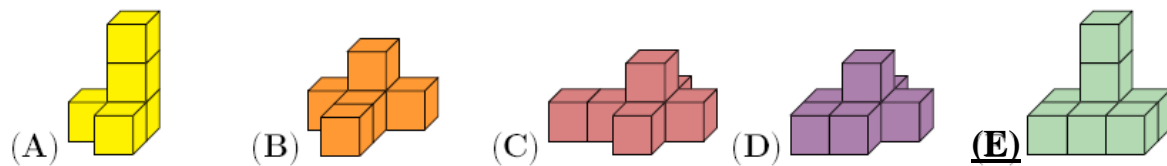
4	3
1	2

(D)

3	4
1	2

(E)

SAMPLE QUESTION FOR 4 POINTS

11. Five shapes are made by gluing cubes together face to face. Which shape uses the most cubes?

(A)   (B)   (C)   (D)   **(E)**

SAMPLE QUESTION FOR 5 POINTS

19. Mark the Bee can walk only on gray cells. In how many ways can you color exactly two white cells gray so that Mark can walk from A to B?

(A) 3   (B) 4   **(C) 5**   (D) 6   (E) 7

Math Kangaroo 2020 Sample Questions

LEVELS 3 AND 4

SAMPLE QUESTION FOR 3 POINTS

6. Elli draws the big square (shown in the picture) with chalk on the pavement. She starts at the square marked with the number 1 and begins jumping. Each time she jumps, she always jumps to a number that is 3 more than the number she is standing on. What is the largest number Elli can jump to?

1	5	8	11
4	7	10	14
24	23	13	18
21	19	16	20

(A) 11   (B) 14   (C) 18   (D) 19   (E) 24
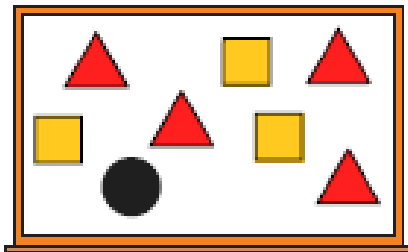
SAMPLE QUESTION FOR 4 POINTS

14. The sum of three numbers is 50. Karin subtracts a secret number from each of these three numbers. She gets 24, 13, and 7 as the results. Which of the following is one of the original three numbers?

(A) 9   (B) 11   (C) 13   (D) 17   (E) 23

SAMPLE QUESTION FOR 5 POINTS

20. The teacher writes the numbers from 1 to 8 on the board. The teacher then covers the numbers with triangles, squares, and a circle. If you add the four numbers covered by the triangles, the sum is 10. If you add the three numbers covered by the squares, the sum is 20. Which number is covered by the circle?

(A) 3   (B) 4   (C) 5   (D) 6   (E) 7

Math Kangaroo 2020 Sample Questions

LEVELS 3 AND 4 ANSWERS

SAMPLE QUESTION FOR 3 POINTS

6. Elli draws the big square (shown in the picture) with chalk on the pavement. She starts at the square marked with the number 1 and begins jumping. Each time she jumps, she always jumps to a number that is 3 more than the number she is standing on. What is the largest number Elli can jump to?

1	5	8	11
4	7	10	14
24	23	13	18
21	19	16	20

(B) 11   (B) 14   (C) 18   **(D) 19**   (E) 24
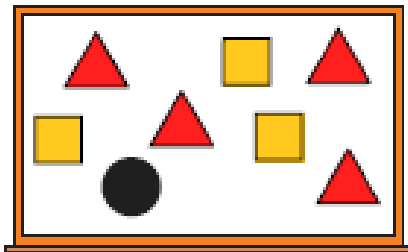
SAMPLE QUESTION FOR 4 POINTS

14. The sum of three numbers is 50. Karin subtracts a secret number from each of these three numbers. She gets 24, 13, and 7 as the results. Which of the following is one of the original three numbers?

(A) 9   (B) 11   (C) 13   (D) 17   (E) 23

SAMPLE QUESTION FOR 5 POINTS

20. The teacher writes the numbers from 1 to 8 on the board. The teacher then covers the numbers with triangles, squares, and a circle. If you add the four numbers covered by the triangles, the sum is 10. If you add the three numbers covered by the squares, the sum is 20. Which number is covered by the circle?
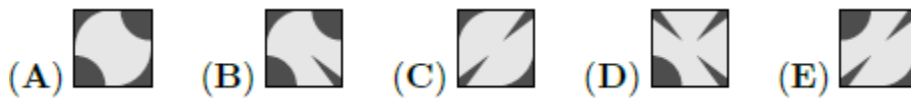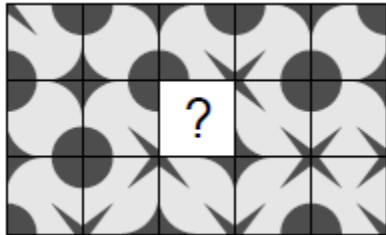

(B) 3   (B) 4   (C) 5   **(D) 6**   (E) 7
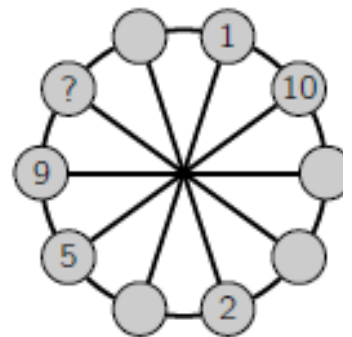
Math Kangaroo 2020 Sample Questions

LEVELS 5 AND 6

SAMPLE QUESTION FOR 3 POINTS

1. Which piece completes the pattern?

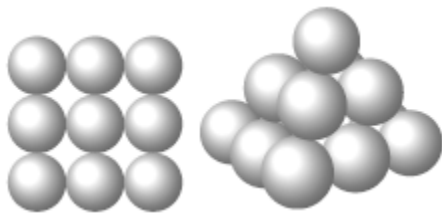(A)   (B)   (C)   (D)   (E)

SAMPLE QUESTION FOR 4 POINTS

11. The numbers from 1 to 10 have to be placed in the small circles, one in each circle. Numbers in any two neighboring circles must have the same sum as the numbers in the two diametrically opposite circles. Some of the numbers are already placed. What number should be placed in the circle with the question mark?

(A) 3   (B) 4   (C) 6   (D) 7   (E) 8

SAMPLE QUESTION FOR 5 POINTS

29. Don builds a pyramid using balls. The square base consists of 3×3 balls. The middle layer has 2×2 balls, and there is one ball at the top. Any two balls that touch each other are glued at their contact point. How many glued contact points are there?
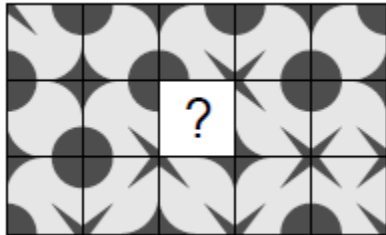

(A) 20   (B) 24   (C) 28   (D) 32   (E) 36

Math Kangaroo 2020 Sample Questions

LEVELS 5 AND 6
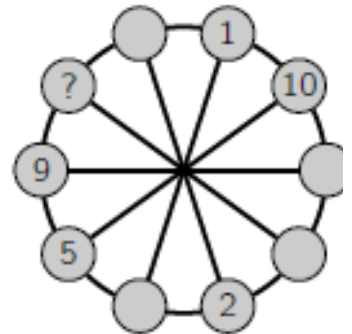
SAMPLE QUESTION FOR 3 POINTS

1. Which piece completes the pattern?

(A) (B) (C) (D) **(E)**

SAMPLE QUESTION FOR 4 POINTS

11. The numbers from 1 to 10 have to be placed in the small circles, one in each circle. Numbers in any two neighboring circles must have the same sum as the numbers in the two diametrically opposite circles. Some of the numbers are already placed. What number should be placed in the circle with the question mark?

(A) 3   (B) 4   (C) 6   (D) 7   (E) 8

SAMPLE QUESTION FOR 5 POINTS

29. Don builds a pyramid using balls. The square base consists of 3 × 3 balls. The middle layer has 2 × 2 balls, and there is one ball at the top. Any two balls that touch each other are glued at their contact point. How many glued contact points are there?
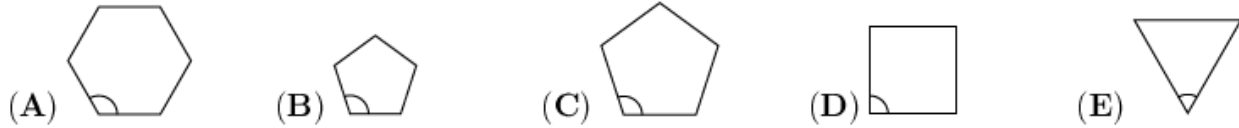

(A) 20   (B) 24   (C) 28   (D) 32   **(E) 36**

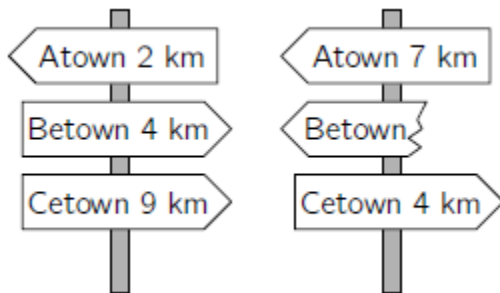# Math Kangaroo 2020 Sample Questions

LEVELS 7 AND 8

SAMPLE QUESTION FOR 3 POINTS

2. In which of the regular polygons below is the marked angle the largest?

(A)   (B)   (C)   (D)   (E)

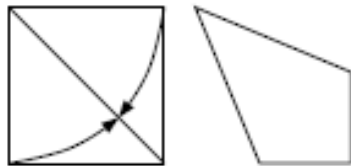**SAMPLE QUESTION FOR 4 POINTS**

11. The shortest path from Atown to Cetown runs through Betown. The two signposts shown are set up along this path. What distance was written on the broken sign?

(A) 1 km   (B) 3 km   (C) 4 km   (D) 5 km   (E) 9 km

SAMPLE QUESTION FOR 5 POINTS

22. Zaida took a square piece of paper and folded two of its sides to the diagonal, as shown, to obtain a quadrilateral. What is the size of the largest angle of the quadrilateral?
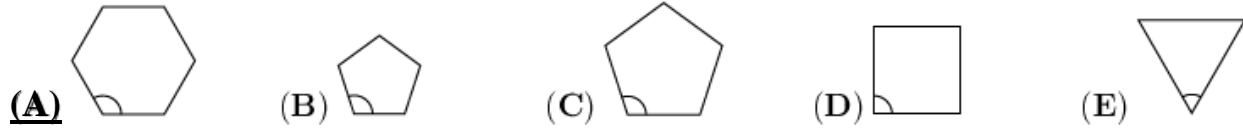

(A) 112.5°   (B) 120°   (C) 125°   (D) 135°   (E) 150°

Math Kangaroo 2020 Sample Questions

LEVELS 7 AND 8 ANSWERS

SAMPLE QUESTION FOR 3 POINTS

2. In which of the regular polygons below is the marked angle the largest?

(A) (B) (C) (D) (E)

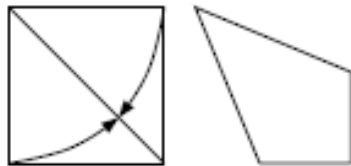### SAMPLE QUESTION FOR 4 POINTS

11. The shortest path from Atown to Cetown runs through Betown. The two signposts shown are set up along this path. What distance was written on the broken sign?

Atown 2 km
Betown 4 km
Cetown 9 km

Atown 7 km
Betown
Cetown 4 km
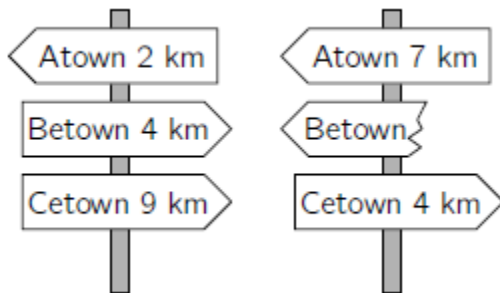
(A) 1 km   (B) 3 km   (C) 4 km   (D) 5 km   (E) 9 km

SAMPLE QUESTION FOR 5 POINTS

22. Zaida took a square piece of paper and folded two of its sides to the diagonal, as shown, to obtain a quadrilateral. What is the size of the largest angle of the quadrilateral?
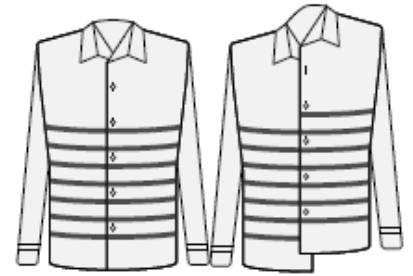
(A) 112.5°   (B) 120°   (C) 125°   (D) 135°   (E) 150°

Math Kangaroo 2020 Sample Questions

LEVELS 9 AND 10
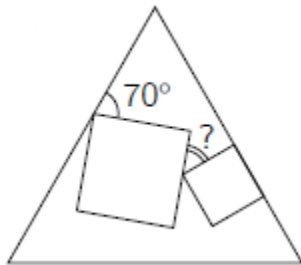
SAMPLE QUESTION FOR 3 POINTS

4. When Cosmo wears his new shirt properly as shown on the left, the horizontal stripes form seven closed rings around his waist. This morning he buttoned his shirt incorrectly, as shown on the right. How many closed rings were there around Cosmo's waist this morning?

(A) 0   (B) 1   (C) 2   (D) 3   (E) 4
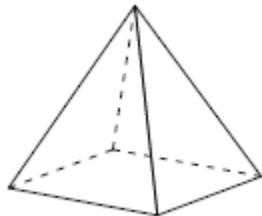
SAMPLE QUESTION FOR 4 POINTS

17. Two squares of different size are drawn inside an equilateral triangle. One side of one of these squares lies on one of the sides of the triangle, as shown. What is the size of the angle marked by the question mark?

(A) 25°   (B) 30°   (C) 35°   (D) 45°   (E) 50°

SAMPLE QUESTION FOR 5 POINTS

25. Kanga labeled the vertices of the square-based pyramid using 1, 2, 3, 4, and 5 once each. For each face Kanga calculated the sum of the numbers on its vertices. Four of these sums are 7, 8, 9, and 10. What is the sum of the numbers at the vertices of the fifth face?
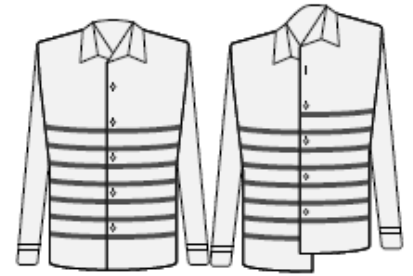
(A) 11   (B) 12   (C) 13   (D) 14   (E) 15

Math Kangaroo 2020 Sample Questions

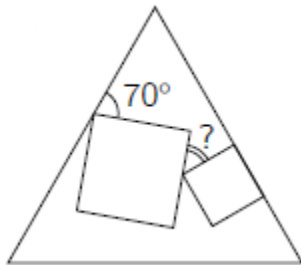# LEVELS 9 AND 10 ANSWERS

SAMPLE QUESTION FOR 3 POINTS

4. When Cosmo wears his new shirt properly as shown on the left, the horizontal stripes form seven closed rings around his waist. This morning he buttoned his shirt incorrectly, as shown on the right. How many closed rings were there around Cosmo's waist this morning?

(A) 0   (B) 1   (C) 2   (D) 3   (E) 4
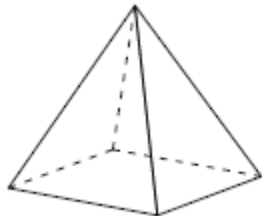
SAMPLE QUESTION FOR 4 POINTS

17. Two squares of different size are drawn inside an equilateral triangle. One side of one of these squares lies on one of the sides of the triangle, as shown. What is the size of the angle marked by the question mark?

(A) 25°   (B) 30°   (C) 35°   (D) 45°   **(E) 50°**

SAMPLE QUESTION FOR 5 POINTS

25. Kanga labeled the vertices of the square-based pyramid using 1, 2, 3, 4, and 5 once each. For each face Kanga calculated the sum of the numbers on its vertices. Four of these sums are 7, 8, 9, and 10. What is the sum of the numbers at the vertices of the fifth face?
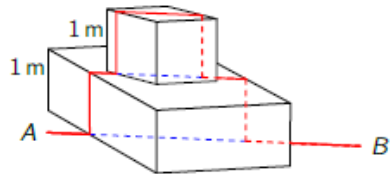

(A) 11   (B) 12   **(C) 13**   (D) 14   (E) 15

Math Kangaroo 2020 Sample Questions

LEVELS 11 AND 12
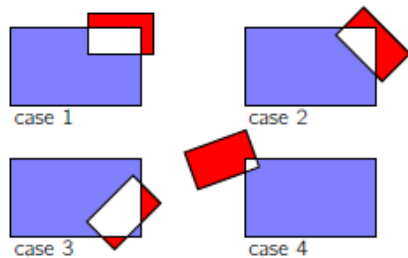
SAMPLE QUESTION FOR 3 POINTS

2. An ant walked every day on a straight horizontal path from A to B, which are 5 m apart. One day humans placed two strange obstacles of height 1 m each on the path. Now the ant walks along or above the same straight line except that it has to climb up and down vertically over both the obstacles, as shown in the picture. How long is the ant's path now?

(A) 7 m   (B) 9 m   (C) $5 + 4\sqrt{2}$ m   (D) $9 - 2\sqrt{2}$ m

(E) The length depends on the angles at which the obstacles are situated along the path.

SAMPLE QUESTION FOR 4 POINTS

11. A blue rectangle and a red rectangle are overlapping. The figure shows 4 different such cases. We denote by B the area of the part of the blue rectangle that is not common to the two rectangles, and we denote by R the area of the red rectangle that is not common to the two rectangles. Which of the following statements is true about the quantity B − R?

(A) In case 1 the quantity B − R is larger than in the other cases.
(B) In case 2 the quantity B − R is larger than in the other cases.
(C) In case 3 the quantity B − R is larger than in the other cases.
(D) In case 4 the quantity B − R is larger than in the other cases.
(E) The quantity B − R is the same in all cases.

SAMPLE QUESTION FOR 5 POINTS

30. Adam and Britt try to find out which of the following figures is Carl's favorite.

Adam knows that Carl has told Britt its shape. Britt knows that Carl has told Adam its color. Then the following conversation takes place. Adam: "I don't know Carl's favorite figure and I know that Britt doesn't know it either." Britt: "At first I didn't know Carl's favorite figure, but now I do." Adam: "Now I know it too." Which figure is Carl's favorite?
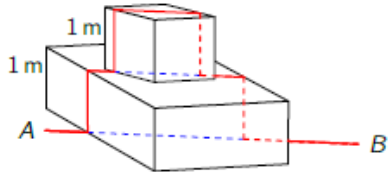

(A)   (B)   (C)   (D)   (E)

Math Kangaroo 2020 Sample Questions

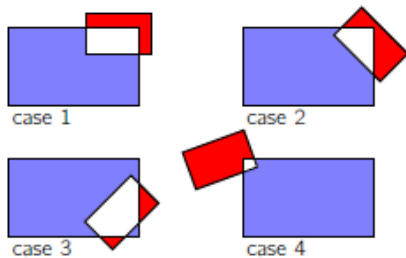# LEVELS 11 AND 12 ANSWERS

SAMPLE QUESTION FOR 3 POINTS

2. An ant walked every day on a straight horizontal path from A to B, which are 5 m apart. One day humans placed two strange obstacles of height 1 m each on the path. Now the ant walks along or above the same straight line except that it has to climb up and down vertically over both the obstacles, as shown in the picture. How long is the ant's path now?

(A) 7 m   **(B) 9 m**   (C) $5 + 4\sqrt{2}$ m   (D) $9 - 2\sqrt{2}$ m
(E) The length depends on the angles at which the obstacles are situated along the path.

SAMPLE QUESTION FOR 4 POINTS

11. A blue rectangle and a red rectangle are overlapping. The figure shows 4 different such cases. We denote by B the area of the part of the blue rectangle that is not common to the two rectangles, and we denote by R the area of the red rectangle that is not common to the two rectangles. Which of the following statements is true about the quantity B – R?

(A) In case 1 the quantity B – R is larger than in the other cases.
(B) In case 2 the quantity B – R is larger than in the other cases.
(C) In case 3 the quantity B – R is larger than in the other cases.
(D) In case 4 the quantity B – R is larger than in the other cases.
(E) The quantity B – R is the same in all cases.

SAMPLE QUESTION FOR 5 POINTS

30. Adam and Britt try to find out which of the following figures is Carl's favorite.

Adam knows that Carl has told Britt its shape. Britt knows that Carl has told Adam its color. Then the following conversation takes place. Adam: "I don't know Carl's favorite figure and I know that Britt doesn't know it either." Britt: "At first I didn't know Carl's favorite figure, but now I do." Adam: "Now I know it too." Which figure is Carl's favorite?

(A)   (B)   **(C)**   (D)   (E)