1988 Q1

1. The diagram shows part of a scale of a measuring device. The arrow indicates an approximate reading of

A) 10.05 B) 10.15 C) 10.25

D) 10.3 E) 10.6

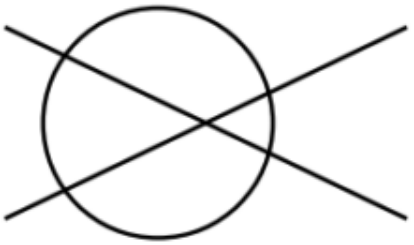
1. D The scale is divided into fourths and the needle is just past the $\frac{1}{4}$ mark, so the reading must be between 10.25 and 10.5.

2002 Q1

1. A circle and two distinct lines are drawn on a sheet of paper. What is the largest possible number of points of intersection of these figures?

(A) 2 **(B)** 3 **(C)** 4 **(D)** 5 **(E)** 6

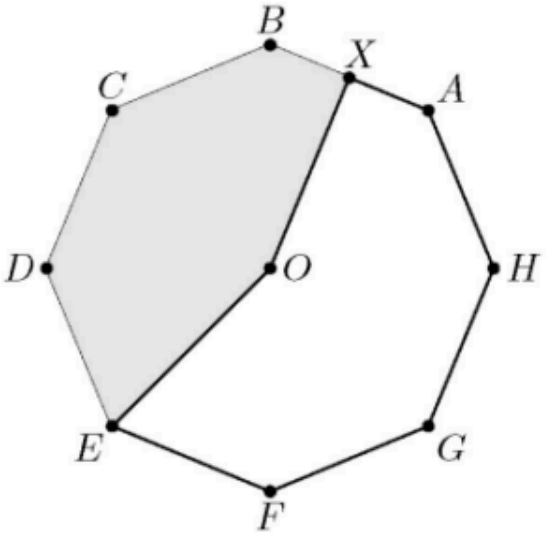
1. **(D)** Two distinct lines can intersect in one point whereas a line can intersect a circle in two points. The maximum number 5 can be achieved if the lines and circle are arranged as shown. Note that the lines could also meet outside the circle for the same result. (Other arrangements of the lines and circle can produce 0, 1, 2, 3, or 4 points of intersection.)



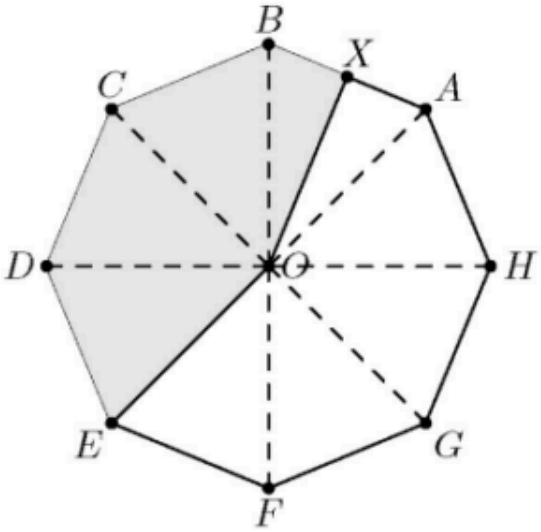
2015 Q2

2. Point O is the center of the regular octagon $ABCDEFGH$, and X is the midpoint of side $\overline{AB}$. What fraction of the area of the octagon is shaded?

(A) $\frac{11}{32}$ **(B)** $\frac{3}{8}$ **(C)** $\frac{13}{32}$ **(D)** $\frac{7}{16}$ **(E)** $\frac{15}{32}$

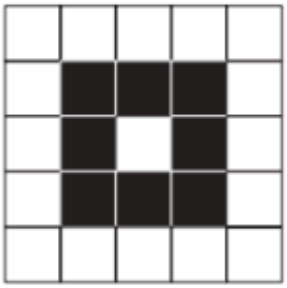


2. **Answer (D):** The octagon can be divided into 8 congruent triangles, 3 of which are $\triangle BOC$, $\triangle COD$, and $\triangle DOE$. The area of $\triangle XOB$ is half the area of one of these, so the fraction of the area of the octagon that is shaded is $3 \cdot \frac{1}{8} + \frac{1}{2} \cdot \frac{1}{8} = \frac{7}{16}$.



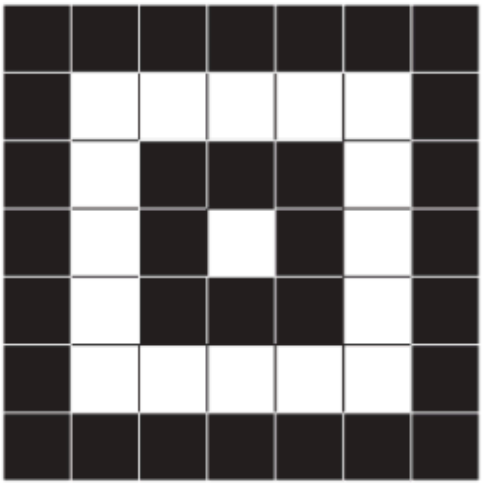
2011 Q3

3. Extend the square pattern of 8 black and 17 white square tiles by attaching a border of black tiles around the square. What is the ratio of black tiles to white tiles in the extended pattern?



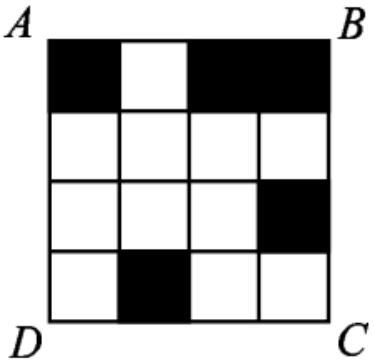
(A) 8 : 17 **(B)** 25 : 49 **(C)** 36 : 25 **(D)** 32 : 17 **(E)** 36 : 17

3. **Answer (D):** There are 32 black tiles and 17 white tiles in the extended pattern. So the ratio is 32 : 17.



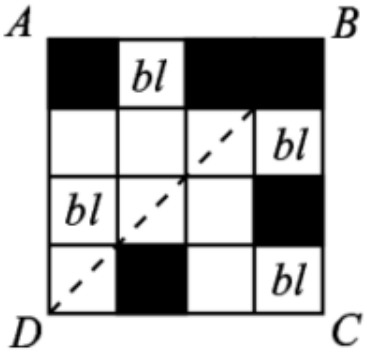
2005 Q3

3. What is the minimum number of small squares that must be colored black so that a line of symmetry lies on the diagonal $\overline{BD}$ of square $ABCD$?



(A) 1 **(B)** 2 **(C)** 3 **(D)** 4 **(E)** 5

3. **(D)** For diagonal BD to lie on a line of symmetry in square $ABCD$, the four small squares labeled *bl* must be colored black.



1990 Q3

3. What fraction of the square is shaded?

A) $\frac{1}{3}$ B) $\frac{2}{5}$ C) $\frac{5}{12}$ D) $\frac{3}{7}$ E) $\frac{1}{2}$

3. E Each shaded piece above or below the diagonal is matched by an identical unshaded piece meaning $\frac{1}{2}$ of the total area is shaded.

2008 Q4

4. In the figure, the outer equilateral triangle has area 16, the inner equilateral triangle has area 1, and the three trapezoids are congruent. What is the area of one of the trapezoids?

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

4. **Answer (C):** The area of the outer triangle with the inner triangle removed is $16 - 1 = 15$, the total area of the three congruent trapezoids. Each trapezoid has area $\frac{15}{3} = 5$.

1988 Q4

4. The figure consists of alternating light and dark squares. The number of dark squares exceeds the number of light squares by

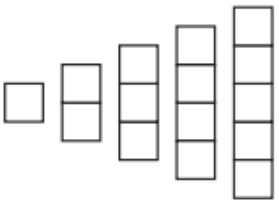
A) 7 B) 8 C) 9

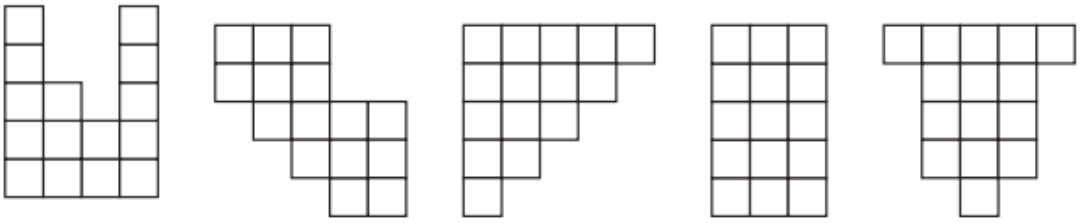
D) 10 E) 11

4. B In each row, including the first, there is one more dark square than light square. Since there are 8 rows, there must be 8 more dark squares than light squares.

2009 Q4

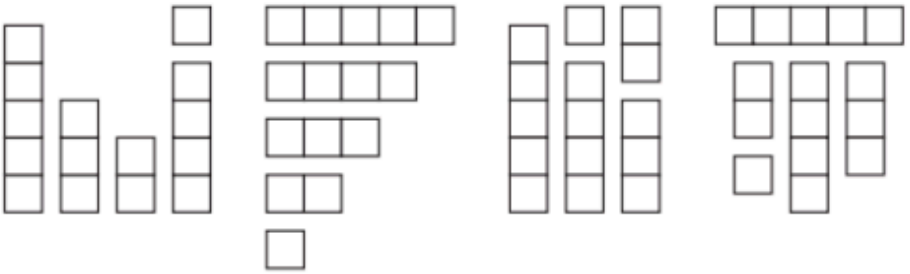
4. The five pieces shown at right can be arranged to form four of the five figures below. Which figure **cannot** be formed?





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

4. **Answer (B):** Figure B does not contain any 5-square-long piece. One solution is given for each of the other four figures. There are other solutions.



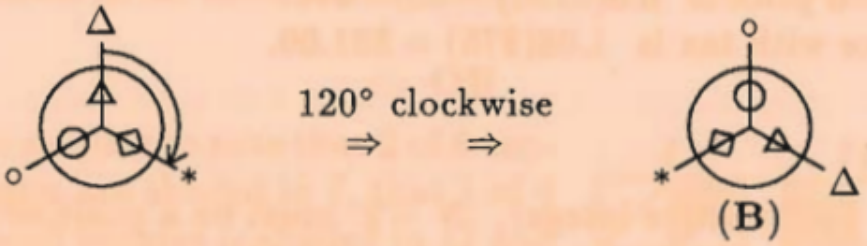
(A) (C) (D) (E)

1994 Q4

4. Which of the following represents the result when the figure shown at the right is rotated clockwise 120° about its center?

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

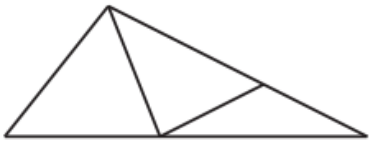
4. **(B)**



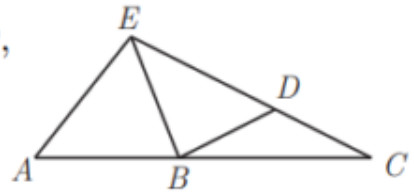
1998 Q4

4. How many triangles are in this figure?
(Some triangles may overlap other triangles.)

(A) 9 **(B)** 8 **(C)** 7 **(D)** 6 **(E)** 5



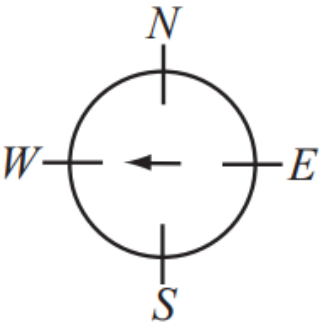
4. **Answer (E):** The triangles are ABE, ACE, BCD, BCE, BDE.



2006 Q4

4. Initially, a spinner points west. Chenille moves it clockwise $2\frac{1}{4}$ revolutions and then counterclockwise $3\frac{3}{4}$ revolutions. In what direction does the spinner point after the two moves?

(A) north **(B)** east **(C)** south **(D)** west **(E)** northwest

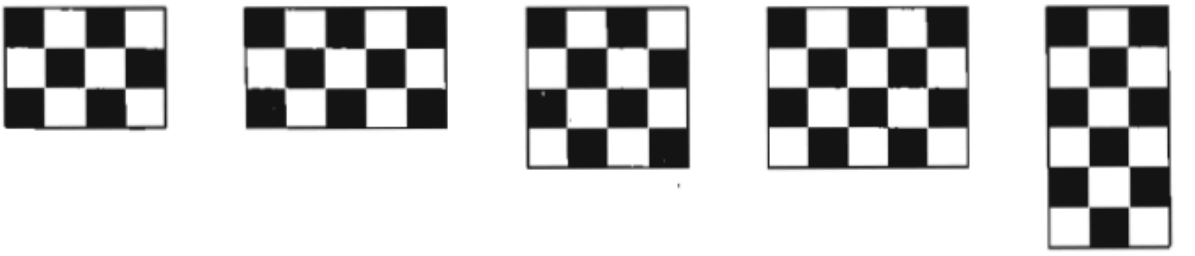


4. **(B)** Ignore the number of complete revolutions because they do not affect direction. One-fourth of the distance around the circle clockwise from west is north. Three-fourths of the distance counterclockwise around the circle from north is east. Chenille's spinner points east.

1991 Q5

5. A "domino" is made up of two small squares:  .
Which of the "checkerboards" illustrated below CANNOT be covered exactly and completely by a whole number of non-overlapping dominoes?

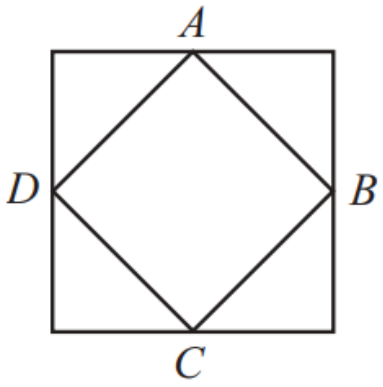
(A) 3×4 **(B)** 3×5 **(C)** 4×4 **(D)** 4×5 **(E)** 6×3



5. **(B)** A collection of non-overlapping dominoes must cover an even number of squares. Since checkerboard (B) has an odd number of squares, it follows that it cannot be covered as required. A little experimentation shows how the other checkerboards can be covered.

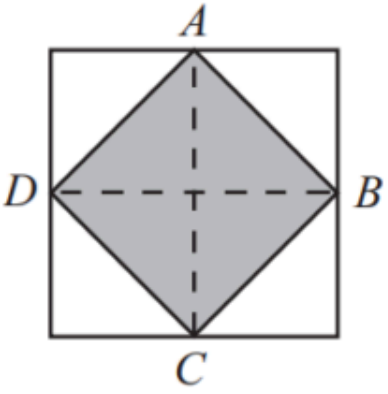
2006 Q5

5. Points A, B, C and D are midpoints of the sides of the larger square. If the larger square has area 60, what is the area of the smaller square?



(A) 15 **(B)** 20 **(C)** 24 **(D)** 30 **(E)** 40

5. **(D)** Divide the larger square into 8 congruent triangles, as shown, 4 of which make up the smaller square.



The area of the smaller square is $\frac{4}{8}$ or $\frac{1}{2}$ of the area of the larger square, so the area of the smaller square is equal to 30.