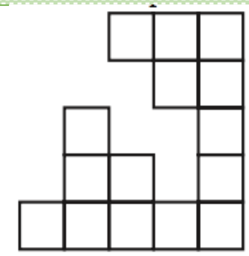
Rotational Symmetry. Properties of multiplication.

Math 2 Classwork 19

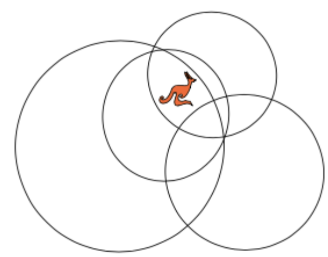
Warm Up

1 A square was composed of 25 small squares, but some of these small squares are lost. How many are lost?



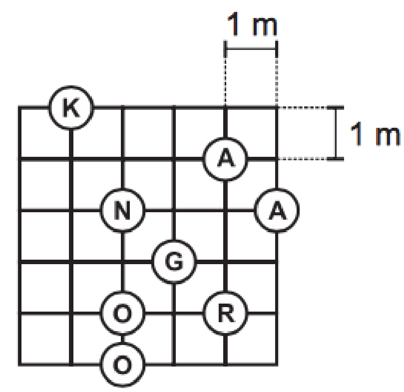
(A) 6 (B) 7 (C) 8 (D) 10 (E) 12

2 The kangaroo is inside how many circles?



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

3 Walking from K to O along the lines pick up the letters KANGAROO in the correct order. What is the length of the shortest walk in meters?



(A)16 m (B)17 m (C)18 m (D)19 m (E)20 m

Homework Review

4 Daniel has a few boxes with pencils. In each box there are either 3 or 5 pencils.

All boxes are closed, he cannot open them and see how many pencils are inside the box. Answer each question by writing the expression to show how he can do it.

a) Can he get exactly 29 pencils without opening any boxes?

____

b) Can he get 14 pencils without opening any boxes?

____

c) Can he get 31 pencils without opening any boxes?

____

New Material I

Rotational Symmetry

A shape has **Rotational Symmetry** when it still looks the same after some rotation (of less than one full turn).

The **order of rotational symmetry** is the number of times an object or shape can be rotated and still look like it did before rotation began.

Think of propeller blades, it will be easier to see orders of rotational symmetry.

There also could be the Orders 5, 6, 7, 9, 10 and so on …

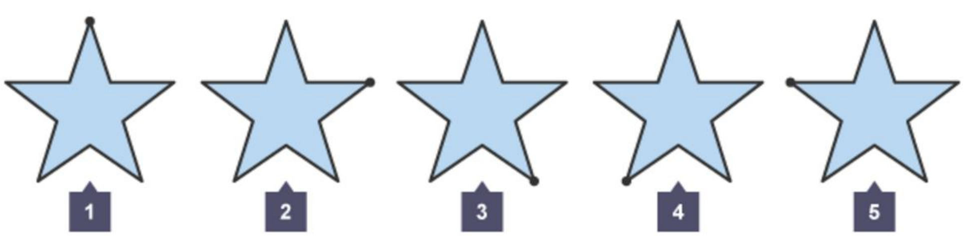
Is there Rotational Symmetry of Order 1 ?

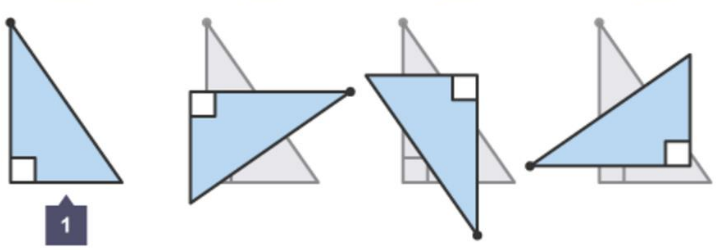
Not really! If a shape only matches itself **once** as we go around (i.e., it matches itself after one full rotation) there is really no symmetry at all ...

... because the word "Symmetry" comes from *syn-* ***together*** and *metron* ***measure***, and there can't be "together" if there is just one thing.

5 What is the order of rotational symmetry for a star? _____

What is the order of rotational symmetry for a right triangle? ______





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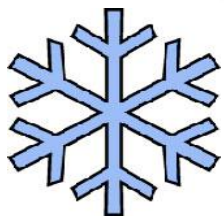
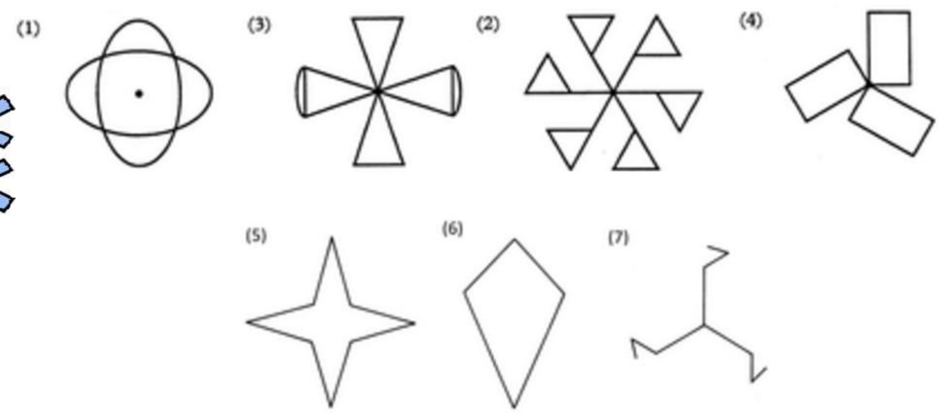
Examples: a) Road signs may possess rotational symmetry:

Order 4 Order 2 Order 3 Order1 (No rotational symmetry)

7

What is the order of rotational symmetry of the shapes below?





REVIEW I

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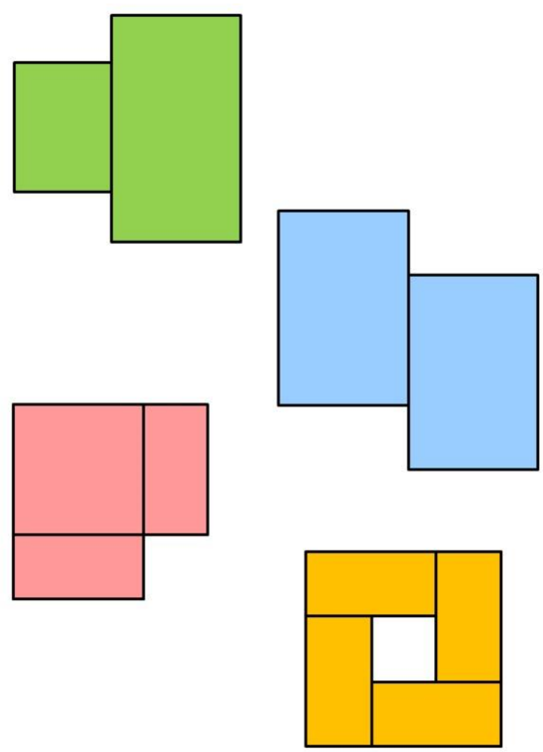
a) Not every shape has a line of symmetry. Which of the four shapes below have a line of symmetry? Draw a line of symmetry on them.



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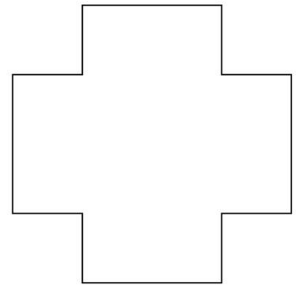
b) Some shapes have many lines of symmetry. Draw all the lines of symmetry you can find on the shape below. How many are there?



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Calculate:

1 × 0 = ______ 7 × 1 =______ 0 × 4 =______ 1 × 17 =______

0 × 18 = ______ 13 × 0 =______ 1 × 9 =______ 15 × 1 =______

100 × 0 = _____ 100 × 1 = _____ 15 × 10 = ____ 10 × 27 = _____

11

Circle all even numbers. How do you know that the number is even?

1, 4, 140, 254, 327, 806, 548, 914, 789

REVIEW II

Properties of Addition

Commutative property	You can add in any order	3 + 6 = 6 + 3 = 9
Associative property	You can group the numbers in any combination	2 + (3 + 4) = (2 + 4) + 3 = 9

12

Remember the addition table of numbers from 1 to 3?

Why do the pairs of numbers in blue squares and orange squares are “mirror” images of each other?

+	1	2	3
1	2	3	4
2	3	4	5
3	4	5	6

The identity element is defined as the element (number) that, when used in a mathematical operation with another number, leaves that number unchanged.

In the case of addition, that element is the **number 0 (zero).**

Identity property of addition	The sum of any number and zero is the number	9 + 0 = 9

13 Calculate smartly, using the properties of addition:

0 + 52 = ___ 52 – 0 = 50 + 2 = ____ 24 + (26 + 2) = ___________

a + 0 = ____ ***a*** – 0 = ___ ***a* + *b*** = _____ ***a* + (*b* + *c*)** = _____________

New Material II

Properties of Multiplication

Commutative property	You can multiply in any order	3 × 6 = 6 × 3 = 18
Associative property	When you multiply you can group the numbers in any combination	2 × (3 × 4) = (2 × 4) × 3 = 24
Identity property	The product of 1 and any number is the number	9 × 1 = 9

14 What is Identity element for multiplication? _______

15 Solve the equations:

9 × ***x* =** 9 ***p*** × 7 = 7 22 × ***r*** = 0 ***q*** × 17 = 0

x = ____ ***p*** = ____ ***r*** = ____ ***q*** = ____

16 Rewrite each problem using the associative property of multiplication and find the answer.

(10 × 5) × 8 = ___________________________________

(7 ×11) × 2 = ____________________________________

9 × (2 × 7) = ______________________________________

18 Which of the examples below illustrates the commutative property of multiplication and which - associative property?

6 × 1= 6 9 × 3 = 3 × 9

6 × (2 × 7) = (6 × 2) × 7 9 × (3 × 7) = (9 × 3) × 7

6 × 2 = 2 × 6 82 × 18 = 18 × 82