Classifying Triangles

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8.1 Classifying Triangles

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[Figure 1]

Marjorie has just returned from her friend Shandra's cottage, where Shandra has hung some beautiful homemade bunting from the ceiling. Marjorie has decided to brighten up her own space by making some bunting too. She wants the point of each triangle to come down at least 16 inches from the string. What type of triangle will Marjorie use to make her bunting?

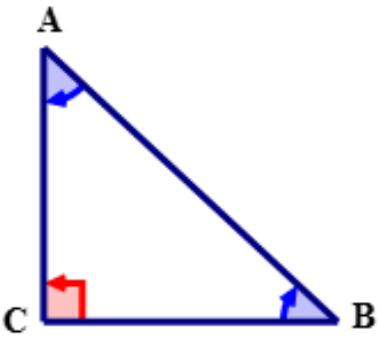
In this concept, you will learn to classify triangles.

Classifying Triangles

A **triangle** is a plane figure with three straight sides and three interior angles. A triangle can be classified by its angles or by its sides. There are seven types of triangles.

Let's look at triangles classified by their interior angles.

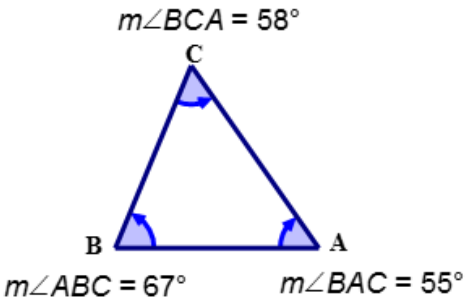
The sum of the three interior angles of a triangle equals 180°. If one of the angles measures exactly 90° the tringle is called a **right triangle**. The other two angles of the triangle share the remaining ninety degrees. These angles are called **acute angles** since the measure of each of the angles is less than 90°. The following diagram is a right triangle. The right angle is indicated by the box in the corner of the triangle at the vertex labeled 'C'.



[Figure 2]

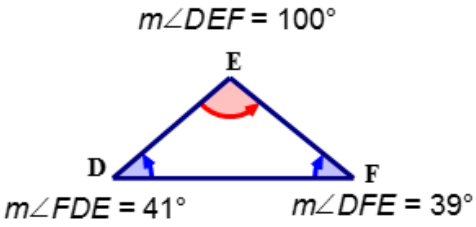
The angle at vertex 'A' and the angle at vertex 'B' are the acute angles of the right triangle.

Another type of triangle is an acute triangle. As its name indicates, each of the three angles of an **acute triangle** measure less than 90°. The following diagram is an acute triangle.



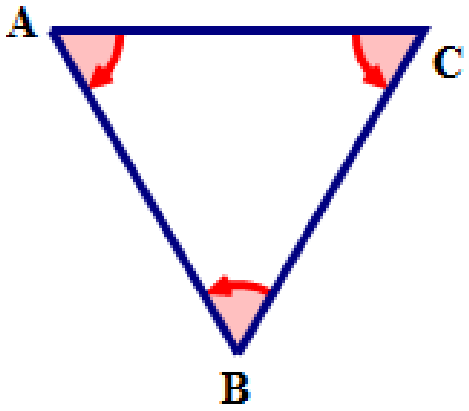
[Figure 3]

. The other two angles of an obtuse triangle are acute angles. The following diagram is an obtuse triangle.**obtuse triangle**. A triangle that has an obtuse angle as one of its interior angles is called an **obtuse angle**An angle with a measure greater than 90° and less than 180° is called an



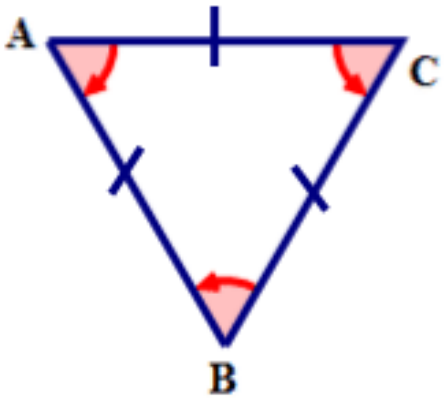
[Figure 4]

An **equiangular triangle** is one in which the measure of each of the interior angles is 60°. If the sum of the angles of a triangle equals 180° then $180^\circ \div 3 = 60^\circ$. The following diagram is an equiangular triangle. The following diagram is an equiangular triangle.



[Figure 5]

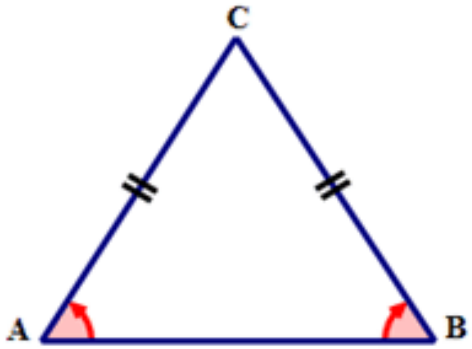
In addition to these triangles named with respect to the interior angles, there are three types of triangles that are named with respect to the sides of the triangles. A triangle that has three angles equal in measure also has three sides that are equal in length. A triangle with three sides equal in length is called an **equilateral triangle**. The following diagram is an equilateral triangle.



[Figure 6]

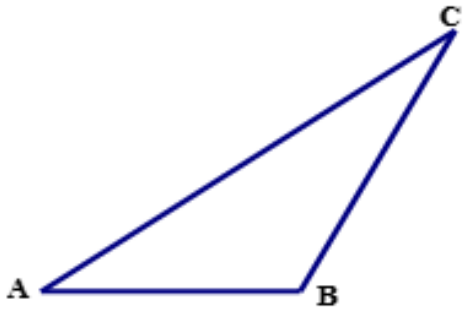
The same markings on the sides of the triangle indicate the sides are equal in length.

Another triangle named with respect to its sides is one that has only two sides equal in length. A triangle with two sides equal in length is called an **isosceles triangle**. If a triangle with three sides equal in length has three angles equal in measure, then a triangle with two sides equal in length has the angles opposite each of the equal sides equal in measure. The following diagram is an isosceles triangle.



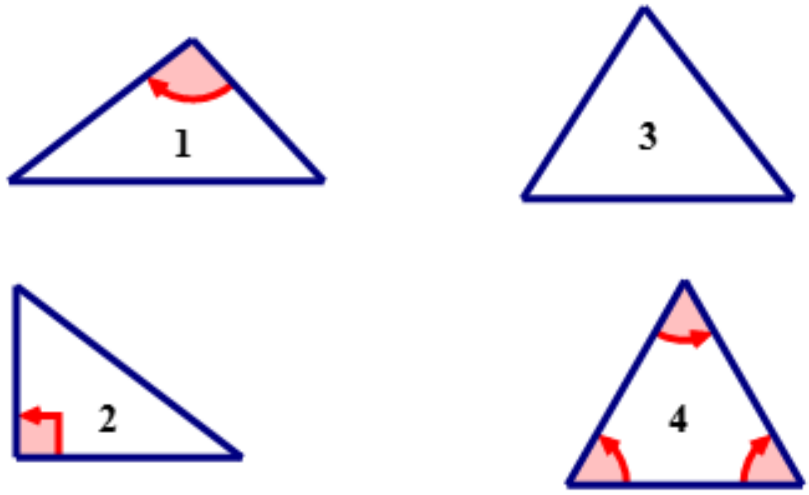
[Figure 7]

The third type of triangle named with respect to its sides is called a **scalene triangle** and it has no sides equal in length and no angles equal in measure. The following diagram is a scalene triangle.



[Figure 8]

The following triangles have been grouped with respect to their interior angles. Let's name the triangles.



[Figure 9]

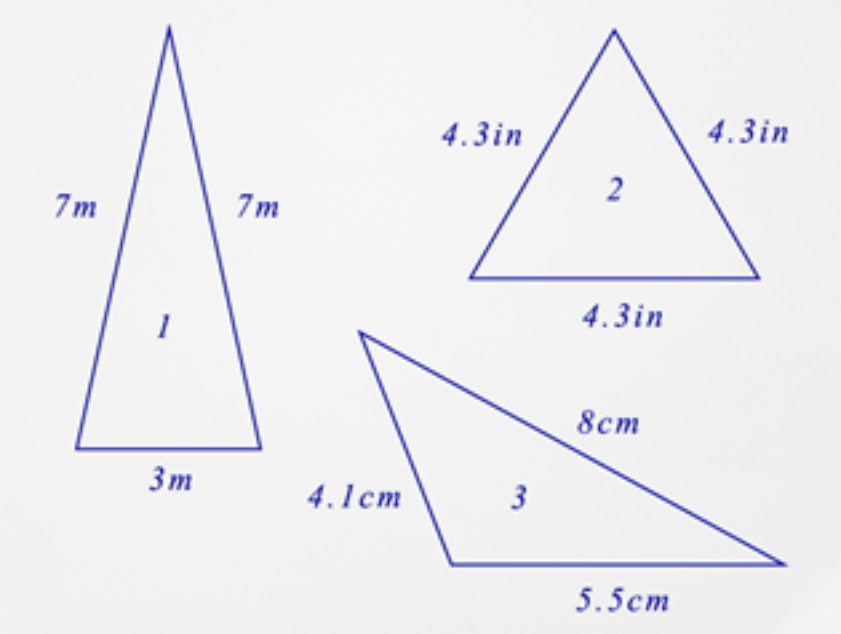
Triangle one is a triangle which shows an angle greater than 90°. This triangle is an obtuse triangle.

Triangle two is a triangle which shows an angle of 90°. The triangle is a right triangle.

Triangle three is a triangle which shows three angles such that each angle is less than 90°. This triangle is an acute triangle.

Triangle four is a triangle which shows three angles of equal measure. This triangle is an equiangular triangle.

The following triangles have been grouped with respect to the measures of their sides. Name the triangles.



[Figure 10]

Triangle one shows a triangle with two sides equal in length – 7 m and 7 m. This triangle is an isosceles triangle.

Triangle two shows a triangle with three sides equal in length – 4.3 in, 4.3 in and 4.3 in. This triangle is an equilateral triangle.

Triangle three shows a triangle with no sides equal in length. This triangle is a scalene triangle.

Examples

Example 1

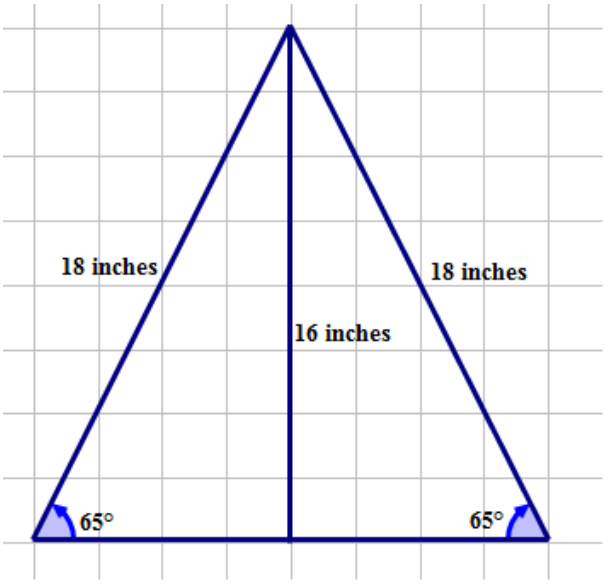
Earlier, you were given a problem about Marjorie and her new bunting.

She needs to figure out what type of triangle to cut out for the curtains.

First, she must figure out what she wants the valance to look like.

She wants the triangles to be tall (16 inches from the base to the point) such that the two sides are equal in length.

Next, Marjorie should sketch the triangle so that she has a pattern to cut out.



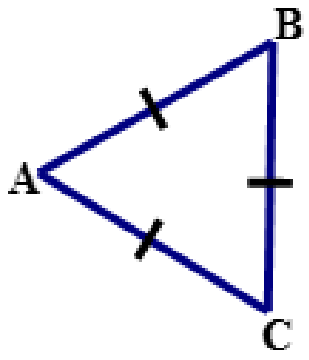
[Figure 11]

$$\text{One block} = 2 \text{ inches}$$

Marjorie should use an acute, isosceles triangle to make the valance for the curtains.

Example 2

Identify the type of triangle below.



[Figure 12]

First, look at the triangle to determine if it has any same markings to indicate either sides equal in length or angles equal in measure.

There are no markings on any of the angles but the three sides of the triangle have a single tic mark on them.

Next, decide the name of the triangle based on whether it has been named according to the sides or the angles.

The triangle has been named according to the length of the sides.

Then, name the type of triangle.

The triangle which has three sides equal in length is called an equilateral triangle.

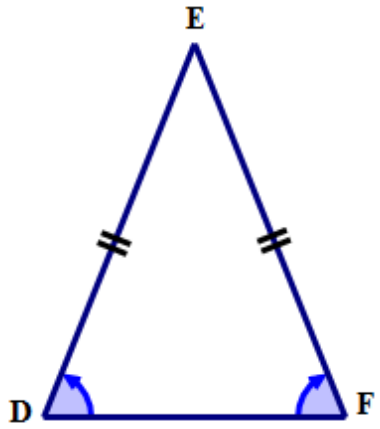
Example 3

What measures can be used to classify triangles?

Triangles can be classified by using the lengths of the sides or the measures of the interior angles.

Example 4

What type of triangle is shown in the diagram? Justify your answer.



[Figure 13]

First, look at the triangle and write down what you know from the diagram.

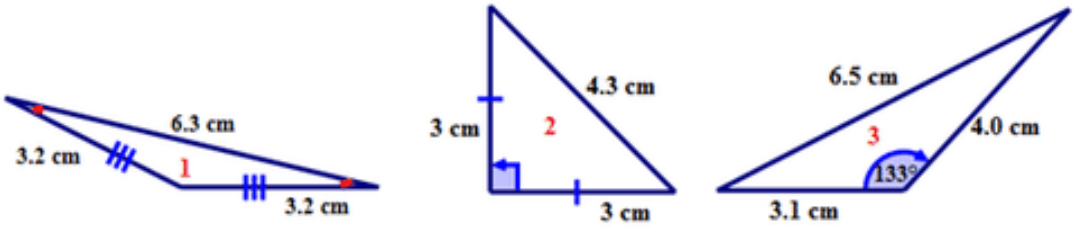
$\overline{DE} = \overline{EF}$ and $m\angle D = m\angle F$.

Next, based on what you have written down, name the type of triangle.

A triangle that has two sides equal in length and the two angles, opposite the equal sides, equal in measure is called an isosceles triangle.

Example 5

Name each of the following triangles with reference to both the side lengths and the interior angles.



[Figure 14]

Triangle one (left):

First, look at the interior angles of the triangle.

There are two acute angles equal in measure and one obtuse angle.

Next, look at the side lengths of the triangle.

There are two sides equal in length.

Then, name the triangle with reference to both the angles and the side lengths.

This triangle is an obtuse, isosceles triangle.

Triangle two (middle):

First, look at the interior angles of the triangle.

There are two acute angles and one 90° angle.

Next, look at the side lengths of the triangle.

There are two sides equal in length.

Then, name the triangle with reference to both the angles and the side lengths.

This triangle is a right, isosceles triangle.

Triangle three (right):

First, look at the interior angles of the triangle.

There are two acute angles and one obtuse angle.

Next, look at the side lengths of the triangle.

There are no sides equal in length.

Then, name the triangle with reference to both the angles and the side lengths.

This triangle is an obtuse, scalene triangle.

Review

Classify each triangle by the given angle measures as acute, obtuse or right.

1. A triangle with three 60° angles.

2. A triangle with one 110° angle.

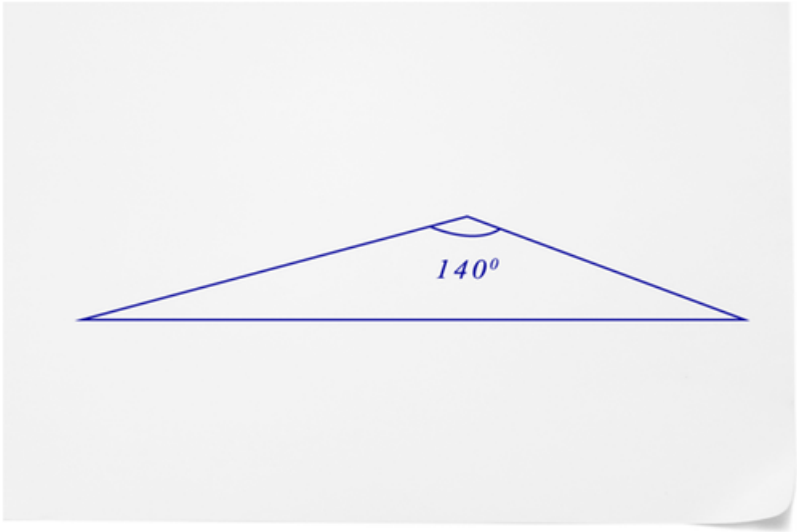
3. A triangle with one right angle and two acute angles.

4. A triangle with one 130° angle.

5. A triangle with three acute angles.

6. A triangle with a 90° angle.

7. A triangle with three angles that are less than 90°.



8. [Figure 15]

Identify each triangle by the side lengths described. Identify them as equilateral, isosceles or scalene.

9. A triangle with side lengths of 6 in, 6 in and 4 inches.

10. A triangle with side lengths of 3 ft., 4 ft., and 5 ft.

11. A triangle with side lengths of 8 inches.

12. A triangle with side lengths of 7 inches, 8 inches and 8 inches.

13. A triangle with side lengths of 6 meters, 8 meters and 10 meters.

14. A triangle with side lengths of 10 mm.

15. A triangle with side lengths of 12 cm.

Review (Answers)

To see the review answers, return to the Table of Contents and select ‘Other Versions’ or ‘Resources’.

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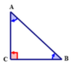	**Credit:** Audrey B. **Source:** https://www.flickr.com/photos/hetkabinet/11591358803/in/photolist-iEhK8R-4Rn3uQ-wpeckM-9uCdza-foH6RT-a6JcZd-9mU66Z-pip5Yn-c9TVwQ-fvtq4s-ecY7Dx-cjezCL-s9oBZa-fMe81p-kU81h8-iEiiJo-eaZ7Es-crt36b-N8b7L-fimkzn-nVpQwk-9YJU1P-c9p8SN-bEQLcc-4DLd1A-ixjS4f-iLZMN5-eGsKGJ-ahuCtF-diKF6u-fp3kLW-ixjSaN-foN3zx-e1Q4Ps-6kZfUt-rRFRzp-odRfcB-EVVPh-cAVPEE-3mj76C-pF6gCP-diJVRK-6TsByv-pEu39T-q3G4SZ-gGfNe-by6HvT-nnMRrR-9xE7tT-qCMHbL
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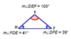
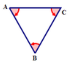
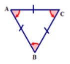
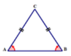
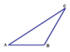
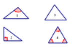
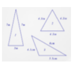
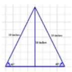
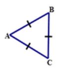
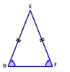
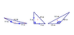
	**Credit:** Audrey B. **Source:** https://www.flickr.com/photos/hetkabinet/11591358803/in/photolist-iEhK8R-4Rn3uQ-wpeckM-9uCdza-foH6RT-a6JcZd-9mU66Z-pip5Yn-c9TVwQ-fvtq4s-ecY7Dx-cjezCL-s9oBZa-fMe81p-kU81h8-iEiiJo-eaZ7Es-crt36b-N8b7L-fimkzn-nVpQwk-9YJU1P-c9p8SN-bEQLcc-4DLd1A-ixjS4f-iLZMN5-eGsKGJ-ahuCtF-diKF6u-fp3kLW-ixjSaN-foN3zx-e1Q4Ps-6kZfUt-rRFRzp-odRfcB-EVVPh-cAVPEE-3mj76C-pF6gCP-diJVRK-6TsByv-pEu39T-q3G4SZ-gGfNe-by6HvT-nnMRrR-9xE7tT-qCMHbL
	**Credit:** Audrey B. **Source:** https://www.flickr.com/photos/hetkabinet/11591358803/in/photolist-iEhK8R-4Rn3uQ-wpeckM-9uCdza-foH6RT-a6JcZd-9mU66Z-pip5Yn-c9TVwQ-fvtq4s-ecY7Dx-cjezCL-s9oBZa-fMe81p-kU81h8-iEiiJo-eaZ7Es-crt36b-N8b7L-fimkzn-nVpQwk-9YJU1P-c9p8SN-bEQLcc-4DLd1A-ixjS4f-iLZMN5-eGsKGJ-ahuCtF-diKF6u-fp3kLW-ixjSaN-foN3zx-e1Q4Ps-6kZfUt-rRFRzp-odRfcB-EVVPh-cAVPEE-3mj76C-pF6gCP-diJVRK-6TsByv-pEu39T-q3G4SZ-gGfNe-by6HvT-nnMRrR-9xE7tT-qCMHbL
	**Credit:** Audrey B. **Source:** https://www.flickr.com/photos/hetkabinet/11591358803/in/photolist-iEhK8R-4Rn3uQ-wpeckM-9uCdza-foH6RT-a6JcZd-9mU66Z-pip5Yn-c9TVwQ-fvtq4s-ecY7Dx-cjezCL-s9oBZa-fMe81p-kU81h8-iEiiJo-eaZ7Es-crt36b-N8b7L-fimkzn-nVpQwk-9YJU1P-c9p8SN-bEQLcc-4DLd1A-ixjS4f-iLZMN5-eGsKGJ-ahuCtF-diKF6u-fp3kLW-ixjSaN-foN3zx-e1Q4Ps-6kZfUt-rRFRzp-odRfcB-EVVPh-cAVPEE-3mj76C-pF6gCP-diJVRK-6TsByv-pEu39T-q3G4SZ-gGfNe-by6HvT-nnMRrR-9xE7tT-qCMHbL
	**Credit:** Audrey B. **Source:** https://www.flickr.com/photos/hetkabinet/11591358803/in/photolist-iEhK8R-4Rn3uQ-wpeckM-9uCdza-foH6RT-a6JcZd-9mU66Z-pip5Yn-c9TVwQ-fvtq4s-ecY7Dx-cjezCL-s9oBZa-fMe81p-kU81h8-iEiiJo-eaZ7Es-crt36b-N8b7L-fimkzn-nVpQwk-9YJU1P-c9p8SN-bEQLcc-4DLd1A-ixjS4f-iLZMN5-eGsKGJ-ahuCtF-diKF6u-fp3kLW-ixjSaN-foN3zx-e1Q4Ps-6kZfUt-rRFRzp-odRfcB-EVVPh-cAVPEE-3mj76C-pF6gCP-diJVRK-6TsByv-pEu39T-q3G4SZ-gGfNe-by6HvT-nnMRrR-9xE7tT-qCMHbL
	**Credit:** Audrey B. **Source:** https://www.flickr.com/photos/hetkabinet/11591358803/in/photolist-iEhK8R-4Rn3uQ-wpeckM-9uCdza-foH6RT-a6JcZd-9mU66Z-pip5Yn-c9TVwQ-fvtq4s-ecY7Dx-cjezCL-s9oBZa-fMe81p-kU81h8-iEiiJo-eaZ7Es-crt36b-N8b7L-fimkzn-nVpQwk-9YJU1P-c9p8SN-bEQLcc-4DLd1A-ixjS4f-iLZMN5-eGsKGJ-ahuCtF-diKF6u-fp3kLW-ixjSaN-foN3zx-e1Q4Ps-6kZfUt-rRFRzp-odRfcB-EVVPh-cAVPEE-3mj76C-pF6gCP-diJVRK-6TsByv-pEu39T-q3G4SZ-gGfNe-by6HvT-nnMRrR-9xE7tT-qCMHbL
	**Credit:** Audrey B. **Source:** https://www.flickr.com/photos/hetkabinet/11591358803/in/photolist-iEhK8R-4Rn3uQ-wpeckM-9uCdza-foH6RT-a6JcZd-9mU66Z-pip5Yn-c9TVwQ-fvtq4s-ecY7Dx-cjezCL-s9oBZa-fMe81p-kU81h8-iEiiJo-eaZ7Es-crt36b-N8b7L-fimkzn-nVpQwk-9YJU1P-c9p8SN-bEQLcc-4DLd1A-ixjS4f-iLZMN5-eGsKGJ-ahuCtF-diKF6u-fp3kLW-ixjSaN-foN3zx-e1Q4Ps-6kZfUt-rRFRzp-odRfcB-EVVPh-cAVPEE-3mj76C-pF6gCP-diJVRK-6TsByv-pEu39T-q3G4SZ-gGfNe-by6HvT-nnMRrR-9xE7tT-qCMHbL
	**Credit:** Audrey B. **Source:** https://www.flickr.com/photos/hetkabinet/11591358803/in/photolist-iEhK8R-4Rn3uQ-wpeckM-9uCdza-foH6RT-a6JcZd-9mU66Z-pip5Yn-c9TVwQ-fvtq4s-ecY7Dx-cjezCL-s9oBZa-fMe81p-kU81h8-iEiiJo-eaZ7Es-crt36b-N8b7L-fimkzn-nVpQwk-9YJU1P-c9p8SN-bEQLcc-4DLd1A-ixjS4f-iLZMN5-eGsKGJ-ahuCtF-diKF6u-fp3kLW-ixjSaN-foN3zx-e1Q4Ps-6kZfUt-rRFRzp-odRfcB-EVVPh-cAVPEE-3mj76C-pF6gCP-diJVRK-6TsByv-pEu39T-q3G4SZ-gGfNe-by6HvT-nnMRrR-9xE7tT-qCMHbL
	**Credit:** Audrey B. **Source:** https://www.flickr.com/photos/hetkabinet/11591358803/in/photolist-iEhK8R-4Rn3uQ-wpeckM-9uCdza-foH6RT-a6JcZd-9mU66Z-pip5Yn-c9TVwQ-fvtq4s-ecY7Dx-cjezCL-s9oBZa-fMe81p-kU81h8-iEiiJo-eaZ7Es-crt36b-N8b7L-fimkzn-nVpQwk-9YJU1P-c9p8SN-bEQLcc-4DLd1A-ixjS4f-iLZMN5-eGsKGJ-ahuCtF-diKF6u-fp3kLW-ixjSaN-foN3zx-e1Q4Ps-6kZfUt-rRFRzp-odRfcB-EVVPh-cAVPEE-3mj76C-pF6gCP-diJVRK-6TsByv-pEu39T-q3G4SZ-gGfNe-by6HvT-nnMRrR-9xE7tT-qCMHbL
	**Credit:** Audrey B. **Source:** https://www.flickr.com/photos/hetkabinet/11591358803/in/photolist-iEhK8R-4Rn3uQ-wpeckM-9uCdza-foH6RT-a6JcZd-9mU66Z-pip5Yn-c9TVwQ-fvtq4s-ecY7Dx-cjezCL-s9oBZa-fMe81p-kU81h8-iEiiJo-eaZ7Es-crt36b-N8b7L-fimkzn-nVpQwk-9YJU1P-c9p8SN-bEQLcc-4DLd1A-ixjS4f-iLZMN5-eGsKGJ-ahuCtF-diKF6u-fp3kLW-ixjSaN-foN3zx-e1Q4Ps-6kZfUt-rRFRzp-odRfcB-EVVPh-cAVPEE-3mj76C-pF6gCP-diJVRK-6TsByv-pEu39T-q3G4SZ-gGfNe-by6HvT-nnMRrR-9xE7tT-qCMHbL
	**Credit:** Audrey B. **Source:** https://www.flickr.com/photos/hetkabinet/11591358803/in/photolist-iEhK8R-4Rn3uQ-wpeckM-9uCdza-foH6RT-a6JcZd-9mU66Z-pip5Yn-c9TVwQ-fvtq4s-ecY7Dx-cjezCL-s9oBZa-fMe81p-kU81h8-iEiiJo-eaZ7Es-crt36b-N8b7L-fimkzn-nVpQwk-9YJU1P-c9p8SN-bEQLcc-4DLd1A-ixjS4f-iLZMN5-eGsKGJ-ahuCtF-diKF6u-fp3kLW-ixjSaN-foN3zx-e1Q4Ps-6kZfUt-rRFRzp-odRfcB-EVVPh-cAVPEE-3mj76C-pF6gCP-diJVRK-6TsByv-pEu39T-q3G4SZ-gGfNe-by6HvT-nnMRrR-9xE7tT-qCMHbL
	**Credit:** Audrey B. **Source:** https://www.flickr.com/photos/hetkabinet/11591358803/in/photolist-iEhK8R-4Rn3uQ-wpeckM-9uCdza-foH6RT-a6JcZd-9mU66Z-pip5Yn-c9TVwQ-fvtq4s-ecY7Dx-cjezCL-s9oBZa-fMe81p-kU81h8-iEiiJo-eaZ7Es-crt36b-N8b7L-fimkzn-nVpQwk-9YJU1P-c9p8SN-bEQLcc-4DLd1A-ixjS4f-iLZMN5-eGsKGJ-ahuCtF-diKF6u-fp3kLW-ixjSaN-foN3zx-e1Q4Ps-6kZfUt-rRFRzp-odRfcB-EVVPh-cAVPEE-3mj76C-pF6gCP-diJVRK-6TsByv-pEu39T-q3G4SZ-gGfNe-by6HvT-nnMRrR-9xE7tT-qCMHbL
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