



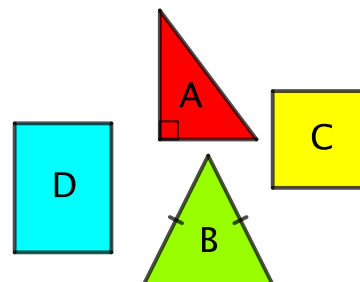
Problem of the Week

Problem B and Solution

Alternate Dimensions

Problem

The four shapes to the right are each drawn with a horizontal base and a vertical height. Figure A is a right-angled triangle, Figure B is an isosceles triangle, Figure C is a square, and Figure D is a rectangle. The figures are not drawn to scale.



Using the following clues, determine the measure of the (horizontal) base and the measure of the (vertical) height of each figure.

1. The measure of the base of Figure A is the same as the measure of the base of Figure D.
2. The measure of the base of Figure A is one unit less than the measure of the base of Figure B.
3. The side length of Figure C is the same as the measure of the base of Figure A.
4. The measure of the height of Figure B is the same as the measure of the height of Figure A and also the same as the measure of the base of Figure B.
5. The area of Figure C is 9 square units.
6. The total area of all four figures is 38 square units.

Solution

From 5., since C is a square with an area of 9 square units, its side length is 3 units.

From 3., A must have a base that is 3 units long.

From 1., D has a base that is 3 units long as well.

From 2., the measure of the base of B is 1 unit greater than that of A, so B has a base that is 4 units long.

From 4., the heights of A and B thus both have a measure of 4 units.

We can now calculate that the area of triangle A is $\frac{1}{2} \times 3 \times 4 = 6$ square units and the area of triangle B is $\frac{1}{2} \times 4 \times 4 = 8$ square units. We also know that the area of square C is 9 square units. Summing, the total area of figures A, B, and C is $6 + 8 + 9 = 23$ square units.

From 6., the total area of all figures is 38 square units, so the area of D is $38 - 23 = 15$ square units. Since D is a rectangle with a base of measure 3, it thus has a height of measure $15 \div 3 = 5$ units.

Therefore,

Figure A has a base of measure 3 units and a height of measure 4 units;

Figure B has a base of measure 4 units and a height of measure 4 units;

Figure C is 3 units by 3 units; and

Figure D has a base of measure 3 units and a height of measure 5 units.

