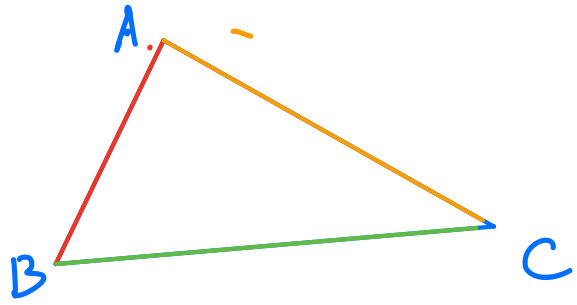
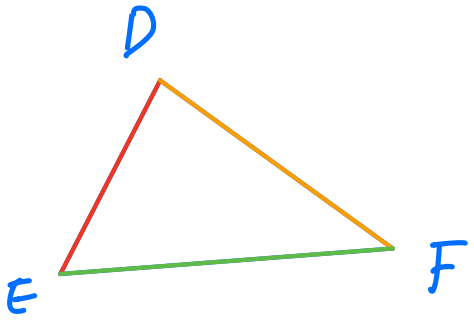
Congruent Triangles.

Case 1

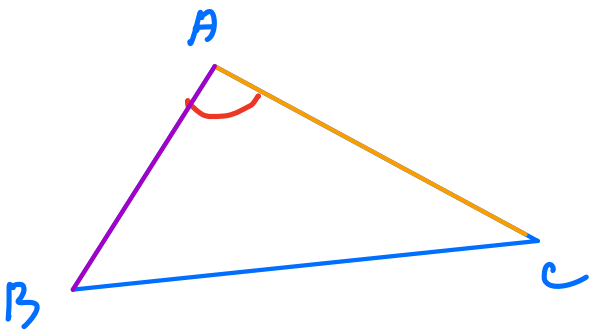
S - S - S

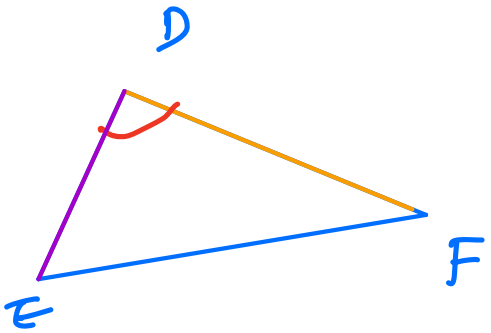




$AB = DE$ $BC = EF$ $AC = DF$

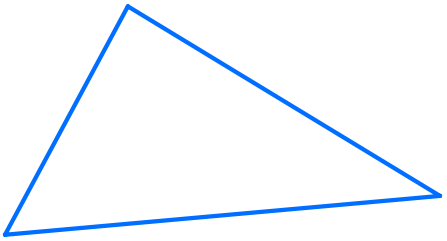
S - A - S

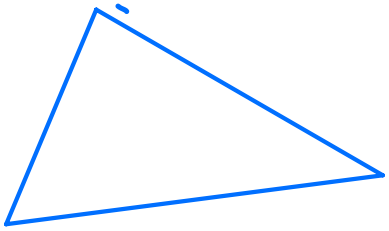




$AB = DE$ $\angle BAC = \angle EDF$ $AC = DF$

A - A - S





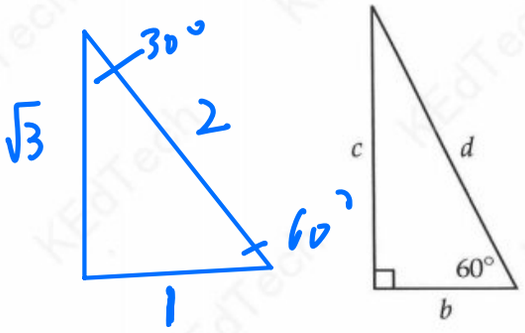
EXERCISE 1: Spare paper recommended. Answers for this exercise start on page 381.

1

A square has a side length of 6 inches. What is the length, in inches, of the square's diagonal?

A) $3\sqrt{2}$
B) 6
C) $6\sqrt{2}$
D) $6\sqrt{3}$

2



Note: Figure not drawn to scale.

For the right triangle shown, $d = 10$. What is the value of b?

A) 5
B) $5\sqrt{2}$
C) $5\sqrt{3}$
D) $10\sqrt{3}$

3

Triangles LMN and PQR are congruent, where L corresponds to P and M corresponds to Q. The measures of angles L and R are 94° and 22°, respectively. What is the measure of angle M?

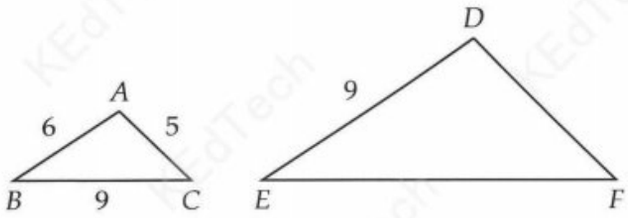
A) 22°
B) 64°
C) 94°
D) 116°

4

Triangles ABC and KLM are similar, where A and B correspond to K and L, respectively. The measure of angle A is 15°, $BC = 24$, and $KM = 3AC$. What is the length of $\overline{LM}$?

A) 8
B) 45
C) 72
D) 216

5



In the figure shown, triangle ABC is similar to triangle DEF. What is the perimeter of triangle DEF?

A) 20
B) 26.8
C) 30
D) 36.2

6

Triangles ABC and JKL are similar, where A corresponds to J, and B and K are right angles. The measure of angle A is 34°, and $KL = \frac{1}{2}BC$. What is the measure of angle L?

A) 17
B) 28
C) 34
D) 56

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7

A right triangle has a hypotenuse of length 31 inches. One of the legs of this triangle has a length of 25 inches and the other leg has a length of $4\sqrt{n}$ inches, where n is an integer constant. What is the value of n ?

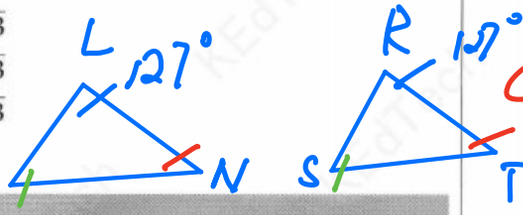
$n = 21$

8

A right triangle has a hypotenuse of length 42 centimeters and an angle measuring 30°. What is the perimeter, in centimeters, of this triangle?

A) $21 + 21\sqrt{3}$
B) $56 + 14\sqrt{3}$
C) $63 + 21\sqrt{3}$
D) $63 + 42\sqrt{3}$

A-A-A.



9

In triangles LMN and RST, angles L and R each have measure 127°. Which additional piece of information is sufficient to determine whether triangle LMN is similar to triangle RST ?

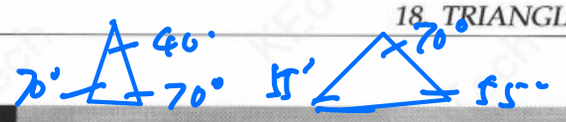
A) The measures of angles N and T
B) The lengths of sides LM and RS
C) The measures of angles S and T
D) The lengths of sides MN and ST

10

When adjusted to a height of 35 feet, a pole casts a shadow that is 14 feet long. By how many feet must the height of the pole be increased so that it casts a shadow that is 18 feet long?

10

11



In triangle XYZ, the measure of angle Y is 70°. Which of the following pieces of information is sufficient to prove that triangle XYZ is an isosceles triangle?

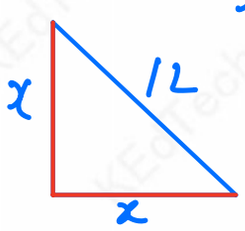
I. The measure of angle X is 40°.
II. The measure of angle Z is 55°.

A) I is sufficient, but II is not.
B) II is sufficient, but I is not.
C) I is sufficient and II is sufficient.
D) Neither I nor II is sufficient.

12

The hypotenuse of an isosceles right triangle has a length of 12 units. What is the area of the triangle, in square units?

A) $18\sqrt{2}$
B) 36
C) 48
D) $36\sqrt{2}$

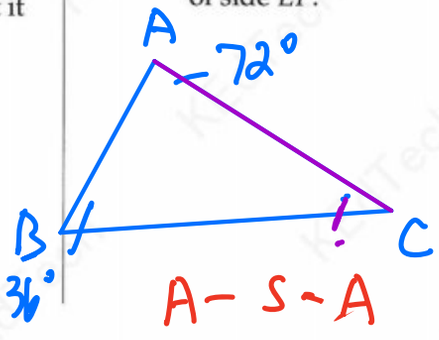


$x^2 + x^2 = 144$
$2x^2 = 144$
$x^2 = 72$
$72 \times \frac{1}{2} = 36$

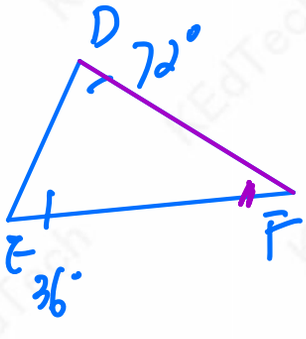
13

In triangles ABC and DEF, angles A and D each have measure 72° and angles B and E each have measure 36°. Which additional piece of information is sufficient to prove that triangle ABC is congruent to triangle DEF ?

A) The measure of angle A is equal to the measure of angle C.
B) The length of side AC is equal to the length of side DF.
C) The measure of angle C is equal to the measure of angle F.
D) The length of side DE is equal to the length of side EF.



A-S-A



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8

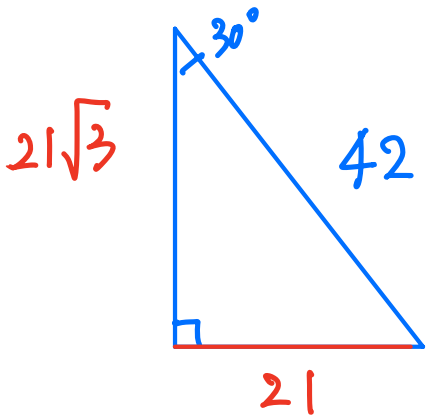
A right triangle has a hypotenuse of length 42 centimeters and an angle measuring 30°. What is the perimeter, in centimeters, of this triangle?

A) $21 + 21\sqrt{3}$

B) $56 + 14\sqrt{3}$

C) $63 + 21\sqrt{3}$

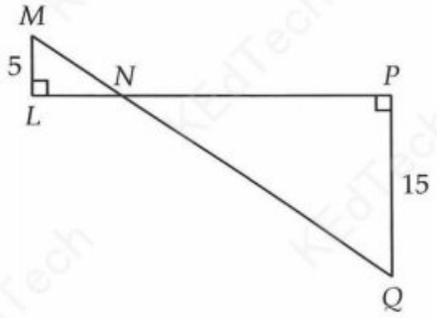
D) $63 + 42\sqrt{3}$



$42 + 21 + 21\sqrt{3} = 63 + 21\sqrt{3}$

C

14



In the figure, $\overline{MQ}$ and $\overline{LP}$ intersect at point N, and $MQ = 38$. What is the length of $\overline{NQ}$?

15

In triangles CDE and FGH, angles C and F each have measure $75°$, $CD = 20$, and $FG = 5$. Which additional piece of information is sufficient to prove that triangle CDE is similar to triangle FGH?

A) The measures of angles D and H are $64°$ and $16°$, respectively.

B) The measures of angles E and G are $70°$ and $35°$, respectively.

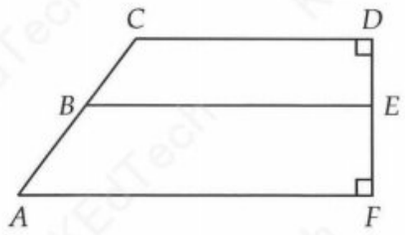
C) $CE = 8$ and $FH = 4$

D) $DE = 16$ and $GH = 4$

16

An equilateral triangle has a perimeter of $42\sqrt{3}$ inches. What is the height, in inches, of this triangle?

17



Note: Figure not drawn to scale.

In the figure, trapezoid $BCDE$ is similar to trapezoid $ABEF$. The length of $\overline{AB}$ is 4, the length of $\overline{DE}$ is 2, and the length of $\overline{BC}$ is equal to the length of $\overline{EF}$. What is the length of $\overline{EF}$?

A) $\sqrt{6}$

B) $2\sqrt{2}$

C) $2\sqrt{3}$

D) 3

18

A right triangle has an area of 450 square inches. The triangle has sides of length $a\sqrt{3}$, $a\sqrt{12}$, and $3a$ inches, where a is a constant. To the nearest tenth of an inch, what is the length of the shortest side of this triangle?

A) 16.1

B) 19.4

C) 21.2

D) 22.8

19

In triangle DEF, the measure of angle D is $90°$ and $\overline{DG}$ is an altitude of the triangle. The length of $\overline{DE}$ is 5, and the length of $\overline{EG}$ is 4. Which of the following ratios has a value of $\frac{3}{4}$?

A) $\frac{DF}{EF}$

B) $\frac{DG}{DF}$

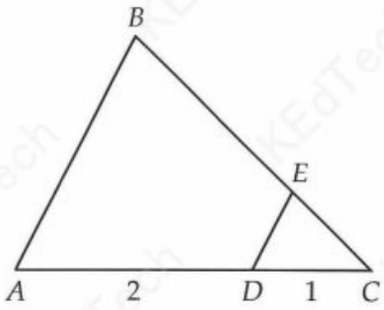
C) $\frac{DG}{FG}$

D) $\frac{FG}{DG}$

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EXERCISE 2: Spare paper recommended. Answers for this exercise start on page 383.

1

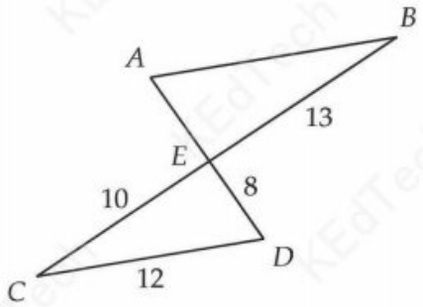


Note: Figure not drawn to scale.

In the figure shown, triangle ABC is similar to triangle DEC such that A corresponds to D and B corresponds to E. The measure of $\angle ABC$ is $120°$. What is the measure of $\angle DEC$?

A) $40°$
B) $60°$
C) $80°$
D) $120°$

2



Note: Figure not drawn to scale.

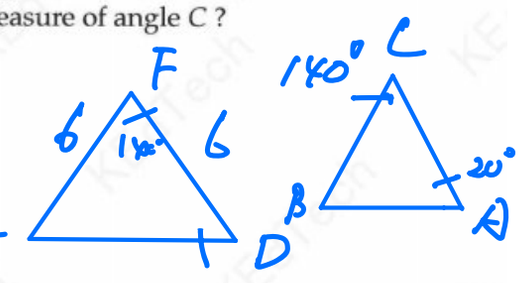
In the figure shown, $\overline{AD}$ and $\overline{BC}$ intersect at point E, and $\overline{AB}$ is parallel to $\overline{CD}$. What is the length of $\overline{AB}$?

A) $\frac{130}{8}$
B) $\frac{130}{12}$
C) $\frac{156}{8}$
D) $\frac{156}{10}$

3

Triangles ABC and DEF are similar, where A corresponds to D and B corresponds to E. The measure of angle A is $20°$, $EF = 6$, and $DF = 6$. What is the measure of angle C ?

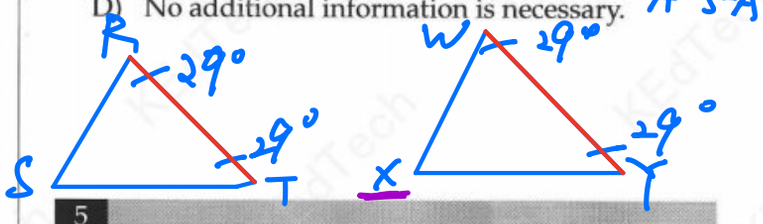
A) $20°$
B) $80°$
C) $140°$
D) $160°$



4

In triangles RST and WXY, angles R, T, W, and Y each have measure $29°$. Which additional piece of information is sufficient to prove that triangle RST is congruent to triangle WXY ?

A) The measures of angle S and angle X are equal.
B) The lengths of sides RT and WX are equal.
C) The lengths of sides RT and WY are equal.
D) No additional information is necessary.



5

A right triangle has legs with lengths of $16\sqrt{23}$ inches and $30\sqrt{23}$ inches. What is the length of the hypotenuse of this triangle, in inches?

A) $34\sqrt{23}$
B) $36\sqrt{23}$
C) $38\sqrt{23}$
D) $42\sqrt{23}$

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