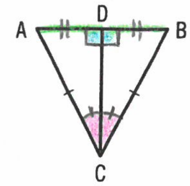
Name: Answer Key

Group: ______________ Date: ______________

CONSOLIDATION 3.1

# Congruent triangles

**1** Identify each geometric statement which allows you to conclude that the adjacent triangles ACD and BCD are congruent, considering that:

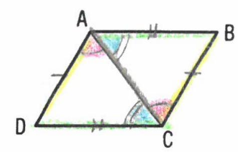



a) $\overline{CD}$ is a median. $\overline{AB} \cong \overline{BD}$ (you have $\overline{AC} \cong \overline{BC}$ & $\overline{DC} \Rightarrow$ same for both)
$\triangle ACD \cong \triangle BCD$ because of SSS

b) $\overline{CD}$ is a bisector of angle ACB. $\angle ACD \cong \angle BCD$ (you have $\overline{AC} \cong \overline{BC}$ and $\overline{DC}$ same for both) $\triangle ACD \cong \triangle BCD$ because of SAS

c) $\overline{CD}$ is the perpendicular bisector of segment AB. $\angle ADC \cong \angle BDC$ and $\overline{AB} \cong \overline{BD}$ (you have $\overline{DC}$ same for both) $\triangle ACD \cong \triangle BCD$ SAS.

**2** In the adjacent illustration, $\overline{AC}$ is a diagonal in the parallelogram ABCD. Complete the following proof to show that ABC and ACD are congruent.




a)

| STATEMENT | JUSTIFICATION |
|---|---|
| $\overline{AB} \cong \overline{DC}$ | opposite sides of a parallelogram are equal |
| $\overline{AD} \cong \overline{BC}$ | opposite sides of a parallelogram are equal |
| $\overline{AC} \cong \overline{CA}$ | congruent to itself |
| $\Delta$ ABC $\cong$ $\Delta$ ACD | Two triangles that have corresponding congruent sides are congruent (SSS). |

b)

| STATEMENT | JUSTIFICATION |
|---|---|
| $\overline{AB} \cong \overline{CD}$ | opposite sides of a parallelogram are equal |
| $\angle BAC \cong \angle ACD$ | alternate interior |
| $\overline{AC} \cong \overline{CA}$ | congruent to itself |
| $\Delta$ ABC $\cong$ $\Delta$ ACD | Two triangles that have one congruent angle contained between corresponding congruent sides are congruent (SAS). |

c)

| STATEMENT | JUSTIFICATION |
|---|---|
| $\angle ACD \cong \angle CAB$ | alternate interior |
| $\overline{AC} \cong \overline{CA}$ | congruent to itself |
| $\angle DAC \cong \angle CBA$ | alternate interior |
| $\Delta$ ABC $\cong$ $\Delta$ ACD | Two triangles that have one congruent side contained between corresponding congruent angles are congruent (ASA). |

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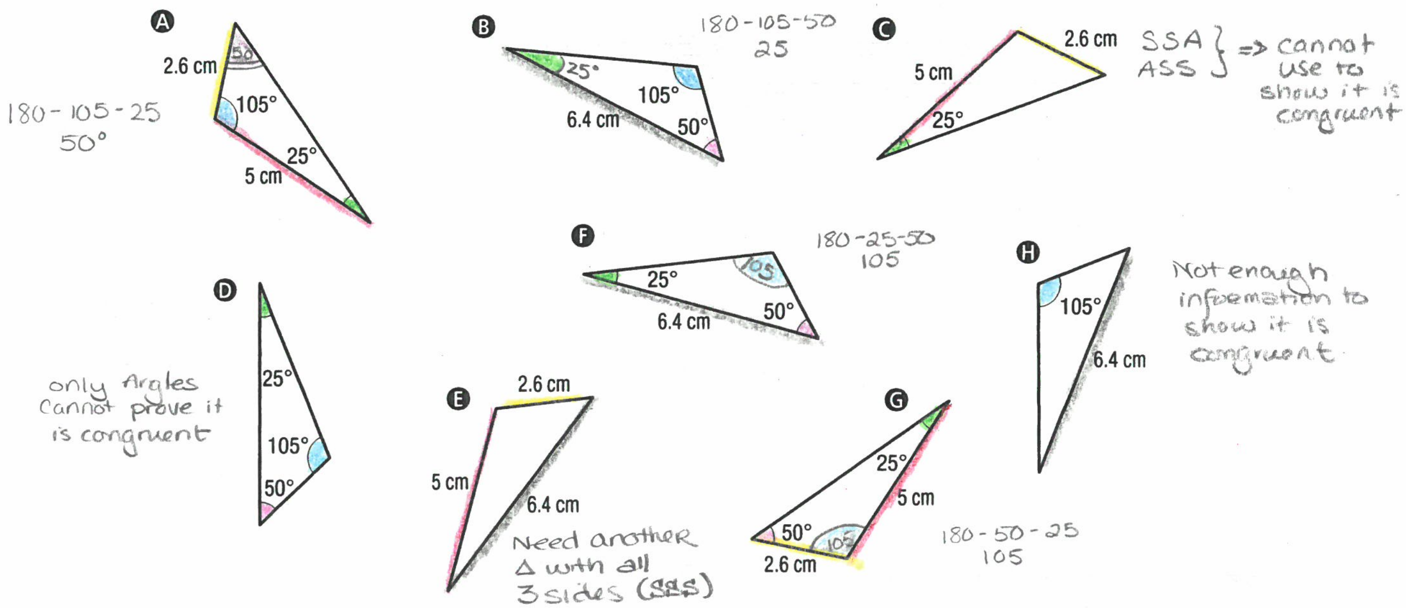
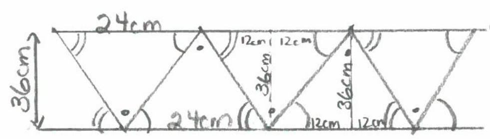
CONSOLIDATION 3.1 *(cont'd)*

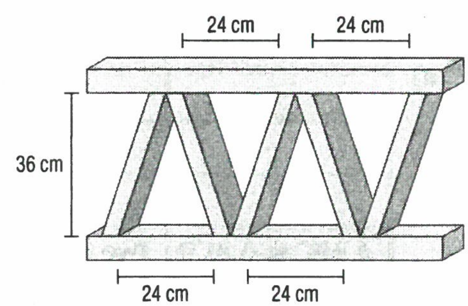
**3** Identify pairs of congruent triangles using the triangles below.




A & G B & F

**4** The adjacent illustration depicts a construction beam used to support a floor. The five straight pieces of wood are equal in length.

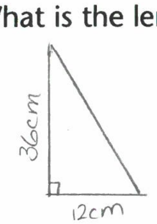



**a)** What geometric statement allows you to state that there are 4 congruent triangles within the beam?

Triangles with corresponding congruent sides are congruent

**b)** What is the length of one of the straight pieces of wood?




$a^2 + b^2 = c^2$

$36^2 + 12^2 = x^2$

$1440 = x^2$

$\sqrt{1440} = x$

$x \approx 37.94733192$

Answer: 37.95 cm

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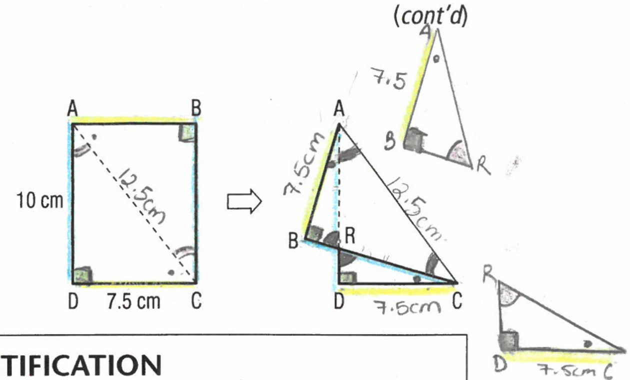
**5** A piece of rectangular paper is folded lengthwise, along one of its diagonals, as shown in the adjacent illustration.




**a)** Complete the table below to show that triangles ABR and CDR are congruent.

| STATEMENT | JUSTIFICATION |
|---|---|
| $\overline{AB} \cong \overline{CD}$ | 1) Opposite sides of a Rectangle are congruent |
| $\angle B \cong \angle D$ | 2) The angles of a Rectangle are congruent (90°) |
| $\angle ARB \cong \angle CRD$ | 3) Vertically Opposite Angles. |
| $\angle BAR \cong \angle DCR$ | 4) The acute angles of a Right Triangle are complementary |
| $\Delta ABR \cong \Delta CDR$ | 5) ASA |

$a^2+b^2=c^2$
$10^2+7.5^2=x^2$
$156.25=x$
$\sqrt{156.25}=x$
$x=12.5cm$

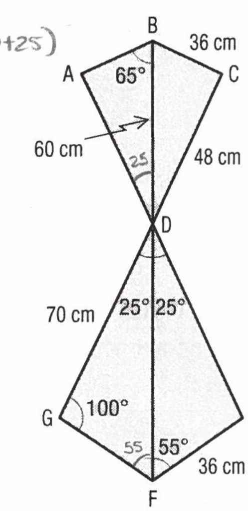
**b)** What is the perimeter of triangle ACR?

Ans ≈ 28.13 cm

**6** For the construction of the kite illustrated below, 7 thin pieces of wood and 2 pieces of fabric were required.

**a)** 1) What is the measure of the angle DFG? $\Delta = 180°$
$180-(100+25)$

Ans: 55° 55°




2) On what geometric statement is your reasoning based?

The sum of the interior angles of a triangle is 180°

**b)** 1) What is the measure of the angle ADB?

Ans: 25°

2) On what geometric statement is your reasoning based?

∠ADB and ∠EDF are vertically opposite and thus congruent

**c)** 1) What type of triangle is BCD? Right Triangle

2) On what geometric statement is your reasoning based? Pythagoras: $a^2+b^2=c^2$
$36^2+48^2=60^2$ ✓

**d)** What geometric transformation allows you to associate triangles ABD and BCD as well as triangles DFG and DEF?

Reflection on the axis $\overline{BF}$