Girls Get Curves

Solution Guide for Chapter 2

Here are the solutions for the "Doing the Math" exercises in *Girls Get Curves*!

DTM from p. 26

2. $4y°$ and $y°$ are supplementary.

This means they add up to 180°, so let's write that, and solve it:

$4y° + y° = 180°$

→ $5y° = 180°$

→ $y° = \frac{180°}{5}$

→ $y° = 36°$

And if $y° = \mathbf{36°}$, that means $4\boldsymbol{y}° = 4(\mathbf{36°}) = \underline{\mathbf{144°}}$

To check our answer: 36° + 144° = 180°? Yep!

Answer: 144° and 36°

3. $x°$ and $(x - 5)°$ are supplementary.

Again, this just means they add up to 180°, so let's write that – and then solve it!

$x° + (x - 5)° = 180°$

→ $x° + x° - 5° = 180°$

→ $2x° - 5° = 180°$

→ $2x° = 185°$

→ $x° = \frac{185°}{2} = \mathbf{92.5}$

And if $x° =$ **92.5°,** that means $(\boldsymbol{x} - 5)° = (\mathbf{92.5} - 5)° = \underline{\mathbf{87.5°}}$

To check our answer: 92.5° + 87.5° = 180°? Yep!

Answer: 92.5° and 87.5°

4. $3g°$ and $(g + 2)°$ are complementary

This means that $3g°$ and $(g + 2)°$ add up to 90°; in other words:

$3g° + (g + 2)° = 90°$

→ $3g° + g° + 2° = 90°$

→ $4g° + 2° = 90°$

→ $4g° = 88°$

→ $g° = \mathbf{22°}$

And if $g° = 22°$, then $3\boldsymbol{g}° = 3(\mathbf{22}°) = \underline{\mathbf{66°}}$, and $(\boldsymbol{g} + 2)° = (\mathbf{22} + 2)° = \underline{\mathbf{24°}}$

To check our work: 66° + 24° = 90°? Yep!

Answer: 66° and 24°

5. $\left(\frac{h}{5}-7\right)^{\circ}$ and $(h + 1)^{\circ}$ are complementary.

If those two things add up to 90°, that means the following must be true:

$$\left(\frac{h}{5}-7\right)^{\circ} + (h + 1)^{\circ} = 90^{\circ}$$

And now we just figure out the h that makes this a true statement, by doing "allowed" things to the equation while isolating h!

$$\left(\frac{h}{5}-7\right)^{\circ} + (h + 1)^{\circ} = 90^{\circ}$$

$\rightarrow \frac{h^{\circ}}{5} - 7^{\circ} + h^{\circ} + 1^{\circ} = 90^{\circ}$

$\rightarrow \frac{h^{\circ}}{5} + h^{\circ} - 6^{\circ} = 90^{\circ}$

$\rightarrow \frac{h^{\circ}}{5} + h^{\circ} = 96^{\circ}$

Now what? Let's multiply both sides by 5 to get rid of the fraction!

$\rightarrow 5\left(\frac{h^{\circ}}{5} + h^{\circ}\right) = 5(96^{\circ})$

$\rightarrow h^{\circ} + 5h^{\circ} = 420$

(I did that multiplication in my head. Know how? First I multiplied 10(96) = 960, and then just divided it in half to get 480!)

$\rightarrow 6h^{\circ} = 480^{\circ}$

$\rightarrow h^{\circ} = \mathbf{80}^{\circ}$

So if $h^{\circ} = 80^{\circ}$, then $\left(\frac{\boldsymbol{h}}{5}-7\right)^{\circ} = \left(\frac{\mathbf{80}}{5}-7\right)^{\circ} = (16 - 7)^{\circ} =$ $\underline{\mathbf{9^{\circ}}}$

And of course $(\boldsymbol{h} + 1) = (\mathbf{80} + 1) = \underline{\mathbf{81^{\circ}}}$

To check our work: 9° + 81°= 90°? Yep!

Answer: 9° and 81°

DTM from p. 31-32

2. All we have to do is look for the markings that match up! So we see two segments with circle marks, and two segments with double kitty scratch marks. Done!

Answer: $\overline{\boldsymbol{CB}} \cong \overline{\boldsymbol{RT}}$ **and** $\overline{\boldsymbol{RA}} \cong \overline{\boldsymbol{AB}}$

3. The right angle appearing at C could just be called $\angle C$ (because C isn't the vertex for any other angle in this diagram), or we could use three letters if we really wanted to. Avoiding the letters Q & T (because the problem told us to!), we could call it $\angle ACB$ or $\angle BCA$.

Answer: $\angle \boldsymbol{C}$, $\angle \boldsymbol{ACB}$, $\angle \boldsymbol{BCA}$

4. The only angles that appear to be obtuse are some of the angles touching the vertex A, and they are: $\angle CAR$ and $\angle BAT$. (We could also say $\angle RAC$ and $\angle TAB$ for these, if we wanted to.)

Answer: $\angle \boldsymbol{CAR}$ **and** $\angle \boldsymbol{BAT}$

5. Without using the point Q, the two straight angles could be called $\angle TAC$ and $\angle RAB$, or, using alternate names for them:

Answer: $\angle \boldsymbol{CAT}$ **and** $\angle \boldsymbol{BAR}$

6. The angles appearing acute are all the interior angles of the two triangles, with the exception of the right angle, of course! (Acute angles are LESS than 90°.) And there are five of them.

Answer: five

7. B, A, and Q are not collinear because they aren't all on the same (straight) line. For example, Q does not lie on $\overleftrightarrow{AB}$.

Answer: no

8. The point A is not *between* the points B and Q, because in order for a point to be between two others, it must be collinear with them, and it isn't! (See previous problem.)

Answer: no

9. The perpendicular segments are the ones forming a right angle - $\overline{CB}$ and $\overline{CT}$. (We also could use $\overline{BC}$ for $\overline{CB}$, or $\overline{TC}$ for $\overline{CT}$, if we wanted.)

Answer: $\boldsymbol{\overline{CB} \perp \overline{CT}}$

(or just $\boldsymbol{\overline{CB}}$ & $\boldsymbol{\overline{CT}}$ - the problem didn't actually ask to write the statement including the perpendicular symbol!)

10. The only other possible name for the ray $\overrightarrow{QA}$ is $\overrightarrow{QC}$, because if we used T, it would be a different ray, including all those points between A and C that aren't a part of $\overrightarrow{QA}$.

Answer: $\boldsymbol{\overrightarrow{QC}}$

11. The other possible names for $\angle BAT$, that wide angle on the right, are: $\angle TAB$, and two more that use Q instead of T: $\angle QAB$ & $\angle BAQ$.

Answer: $\boldsymbol{\angle TAB}$, $\boldsymbol{\angle QAB, \angle BAQ}$

12. Supplementary angles are pairs of angles that add up to 180°, a straight angle, right? So the supplementary pairs on this diagram are the ones that add up to make the straight angles (that appear in the center of the diagram – all surrounding the point A).
Notice that $\angle CAR$ & $\angle BAC$ add up to make a straight angle $\angle BAR$, and so do $\angle BAT$ & $\angle RAT$. On the other hand, the straight angle $\angle CAT$ can be created by adding together $\angle BAC$ & $\angle BAT$ or even $\angle CAR$ & $\angle RAT$.

Answer: The supplementary pairs are $\angle BAC$ & $\angle CAR$, $\angle BAT$ & $\angle RAT$, $\angle BAC$ & $\angle BAT$, and $\angle RAT$ & $\angle CAR$.

13. To find the pair of complementary angles, we have to ask ourselves, "Which two angles, when added together, will equal 90°?" Well, the hint tells us that the degrees in any triangle always add up to 180°. Do we have any information about the angles in either of the two triangles in this diagram? Sure! In $\triangle CAB$, we know that $\angle C = 90°$. And since the angles in any triangle add up to 180°, that means it must be true that the other two angles in $\triangle CAB$ add up to 90°, so that all three add up to 180°! In other words, it must be true that $\angle CAB$ & $\angle B$ are complementary. Ta-da!

Answer: $\angle CAB$ & $\angle B$

Note: There are multiple ways to express most angles, by the way! The first and last letters of any 3-letter angle can always be swapped, and we'd still end up expressing the same angle. For example, $\angle BAR$ is the same exact angle as $\angle RAB$.