CPCTC, CASTC & CSSTP

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| When Triangles are Congruent $(△ABC≅△DEF)$: | When Triangles are Similar $(△ABC\~△DEF)$: |
| **CPCTC** | **CASTC** | **CSSTP** |
|  Sides & Angles | Angles Only! | Sides Only! |
| $\overline{BC}≅\overline{EF}$, $\overline{AC}≅\overline{DF}$ & $\overline{AB}≅\overline{DE}$ | $∠A≅∠D$, $∠B≅∠E$ & $∠C≅∠F$ | $$\frac{BC}{EF}=\frac{AC}{DF}=\frac{AB}{DE}$$ |
| $$\genfrac{}{}{0pt}{}{\overline{BC}≅\overline{EF}}{ }\genfrac{}{}{0pt}{}{\overline{AC}≅\overline{DF}}{\begin{array}{c}\uparrow \\have\end{array}\begin{array}{c}\uparrow \\ \& want\end{array}}\genfrac{}{}{0pt}{}{\overline{AB}≅\overline{DE}}{ \begin{array}{c}\uparrow \\have\end{array}}$$To solvePick the pair with you want (CPCTC)Make them equal (Def. $≅$)Plug in what you know (Subst.)Simplify, if neededSolve, if needed(+/-/x/÷ Prop =) | $$\genfrac{}{}{0pt}{}{∠A≅∠D}{\begin{array}{c}\uparrow \\have\end{array}\begin{array}{c}\uparrow \\ \& want\end{array}} \genfrac{}{}{0pt}{}{∠B≅∠E}{ }\genfrac{}{}{0pt}{}{ ∠C≅∠F}{ \begin{array}{c}\uparrow \\have\end{array}}$$To solvePick the pair with you want (CASTC)Make them equal (Def. $≅$)Plug in what you know (Subst.)Combine like terms, if needed (Simp.)Solve, if needed (+/-/x/÷ Prop =)Plug in *x*, if needed (Subst.)Simplify, if needed | $$\genfrac{}{}{0pt}{}{\frac{BC}{EF} = \frac{AC}{DF} = \frac{AB}{DE}}{\begin{array}{c}\uparrow \uparrow \uparrow \\have want don^{'}t\\both one want\end{array}}$$To solvePick two fractions to use:the one with you want & the one that has both top and bottomMake the fractions equal (CSSTP) Plug in what you know (Subst.) Cross multiply (Mult. Prop. =)Divide, if needed (Div. Prop. =) |
|  | $$\genfrac{}{}{0pt}{}{∠A≅∠D}{\begin{array}{c}\uparrow \\have\end{array} } \genfrac{}{}{0pt}{}{∠B≅∠E}{ \begin{array}{c}\uparrow \\want\end{array}} \genfrac{}{}{0pt}{}{∠C≅∠F}{ \begin{array}{c}\uparrow \\have\end{array}}$$To solvePick the triangle you are going to usePick the angle(s) you will subst. (CASTC)Make the angles equal (Def. $≅$)Plug in what you know (Subst.)Setup Triangle Sum TheoremPlug in what you know (Subst.)Combine like terms (Simp.)Solve (+/-/x/÷ Prop =)Plug in *x*, if needed (Subst.)Simplify, if needed |  |

For each problem, identify which property you must use (CPCTC, CASTC or CSSTP), then solve for the desired part.

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| 1. $△GHK\~△LMN, $$$HK=15, GK=25, $$$LM=12 \& LN=15$. Determine $MN$.(Property: \_\_\_\_\_\_\_\_\_\_\_\_\_) | 2. $△PQR≅△STV, $$PQ=9, PR=8 \& TV=5.$ Determine $SV$.(Property: \_\_\_\_\_\_\_\_\_\_\_\_\_) | 3. $△KLM\~△NPQ, $$m∠K=38° \& m∠L=120°$. Determine $m∠P$.(Property: \_\_\_\_\_\_\_\_\_\_\_\_\_) | 4. $△DEF\~△GHJ, $$$DF=45, GH=16, $$$\& GJ=18$. Determine $DE$.(Property: \_\_\_\_\_\_\_\_\_\_\_\_\_) |
| 5. $△WYZ\~△ABC, m∠Y=28° \& $$m∠A=47°$. Determine $m∠C$.(Property: \_\_\_\_\_\_\_\_\_\_\_\_\_) | 6. $△RST\~△VWY, RS=9,$$ VW=3, WY=9 \& VY=10$. Determine $ST$.(Property: \_\_\_\_\_\_\_\_\_\_\_\_\_) | 7. $△ABZ≅△CDE, m∠C=40° \& $$m∠E=90°$. Determine $m∠A$.(Property: \_\_\_\_\_\_\_\_\_\_\_\_\_) |
| 8. $△FGH\~△KLM, FG=4,$$ GH=10, LM=15 \& KM=18$. Determine $FH$.(Property: \_\_\_\_\_\_\_\_\_\_\_\_\_) | 9. $△QRS≅△TVW, QS=7,$$TV=8 \& VW=2.$ Determine $TW$.(Property: \_\_\_\_\_\_\_\_\_\_\_\_\_) | 10. $△BCD\~△EFG, BD=24, $$EF=25, FG=35 \& EG=30$. Determine $BC$.(Property: \_\_\_\_\_\_\_\_\_\_\_\_\_) |

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| **Example:** $△LMN\~△DEF, m∠L=\left(2x-4\right)°,$$m∠M=(5x-10)° \& m∠E=(3x+14)°.$ Determine $m∠E$.$$∠L≅∠D, ∠M≅∠E, ∠N≅∠F$$$$\genfrac{}{}{0pt}{}{m∠L=m∠D, }{\begin{array}{c}\uparrow \\have\end{array} } \genfrac{}{}{0pt}{}{m∠N=m∠F}{ }$$$$5x-10=3x+14$$$$2x-10=14$$$$2x=24$$$$x=12$$$$m∠E=3\left(12\right)+14$$$$$$ | **Example:** $△ABC≅△PQR, m∠P=\left(3x+20\right)°,$$m∠Q=(18x)° \& m∠C=(9x+10)°.$ Determine $m∠A$.$$∠A≅∠P, ∠B≅∠Q, ∠C≅∠R$$$$\genfrac{}{}{0pt}{}{m∠A=m∠P, }{ \begin{array}{c}\uparrow \\have\end{array}}\genfrac{}{}{0pt}{}{m∠B=m∠Q, }{ \begin{array}{c}\uparrow \\have\end{array}}\genfrac{}{}{0pt}{}{m∠C=m∠R}{\begin{array}{c}\uparrow \\have\end{array} }$$$$m∠P+m∠Q+m∠R=180$$$$\left(3x+20\right)+\left(18x\right)+\left(9x+10\right)=180$$$$30x+30=180$$$$30x=150$$$$x=5$$$$m∠A=3\left(5\right)+20$$$$$$ |
| 11. $△ABC≅△DEF, AB=3x-16,BC=2x-8, $$AC=x-1 \& DE=2x-10.$ Determine $AB$. | 12. $△GHJ\~△STV, m∠H=(3x+15)°,m∠S=(x+30)°$$ \& m∠V=(5x)°.$ Determine $m∠H$. |
| 13. $△DEF≅△PQR, m∠D=\left(10x-10\right)°,$$m∠P=(8x+4)° \& m∠Q=(4x+2)°.$ Determine $m∠P$. | 14. $△LMN≅△RST, LM=2x-1,MN=x+4, $$LN=4x-6 \& ST=4x-5.$ Determine $ST$. |

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| 5. CASTC;$ m∠C=105°$ | 6. CSSTP; $ST=27$ | 7. CPCTC; $m∠A=40°$ | 8. CSSTP; $FH=12$ |
| 9. CPCTC; $TW=7$ | 10. CSSTP; $BC=20$ | 11. $AB=2$ | 12. $m∠H=60°$ |
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