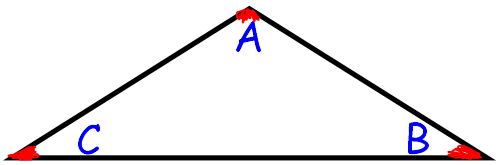
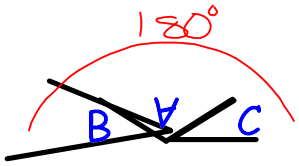
5.3 Angles in Triangles

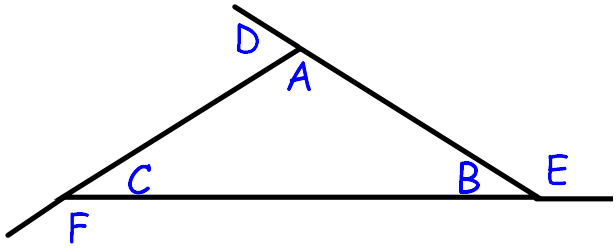


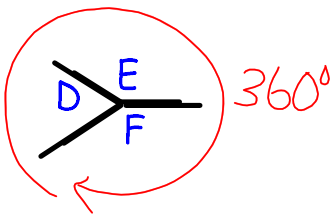
1.Draw a large triangle
2. Label the angles A, B, C and colour in the corner.
3. Cut out the triangles.
4. Tear off the corners and fit them together.
What angle do they form?



Compare your answers with others.

5. Extend one side at each vertex as shown in the diagram.
6. Label the new angles D, E, F.
7. Cut out and then fit the new angles together and measure their sum.
What do you notice?
Compare your answers with others.

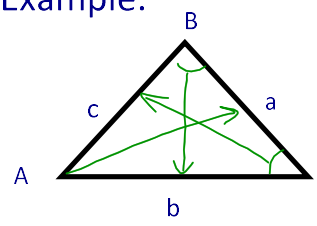




Labelling Non-Right Triangles

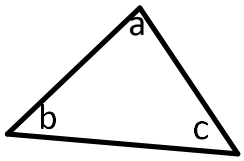
- Angles are denoted by capital letters
- Sides are denoted by lowercase letters

Example:

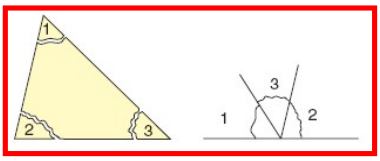


- side 'a' is opposite angle A
- the smallest angle is opposite the smallest side
- the largest angle is opposite the longest side
- the sum of the 2 smaller sides must be greater than the 3rd side

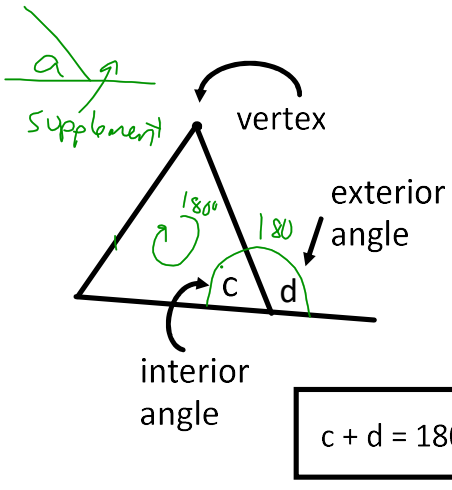
1) ASTT- Angle Sum of a Triangle Theorem



$a + b + c = 180^\circ$



The interior angles of a triangle add to 180°.

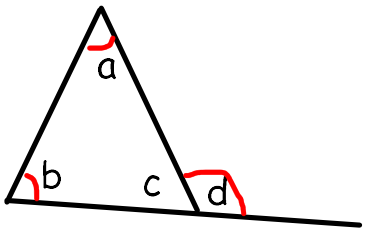


$c + d = 180^\circ$

An exterior angle and the adjacent interior angle are supplementary

2) EAT - The Exterior Angle Theorem

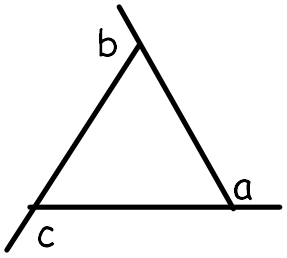
i)



An exterior angle of a triangle is equal to the sum of the interior opposite angles.

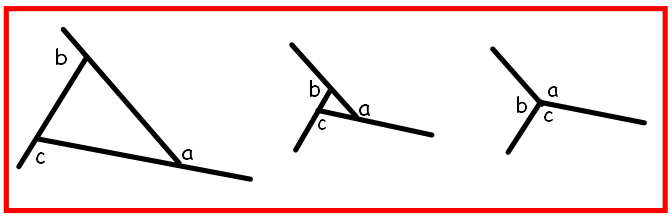
$a + b = d$

ii)



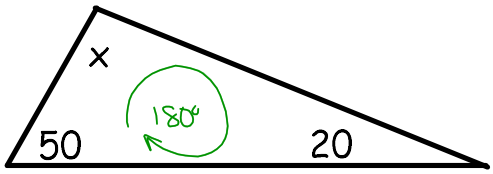
The sum of the exterior angles of a triangle is 360°.

$a + b + c = 360^\circ$



Ex 1. Find the unknown

a)



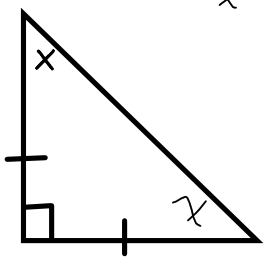
$x+20+50=180$

$x+70=180$

$x=180-70$

$\boxed{x=110}$

b)



$x+x+90=180$

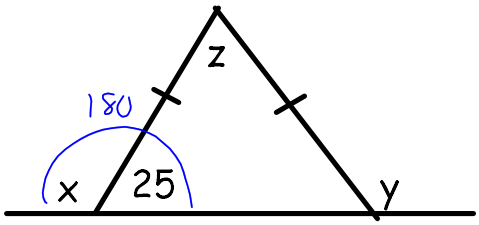
$2x=180-90$

$\frac{2x}{2}=\frac{90}{2}$

$x=\frac{90}{2}$

$=45$

c)



$x+25=180$

$x=180-25$

$\boxed{x=155}$

$y=x$ (SAT, ITT)

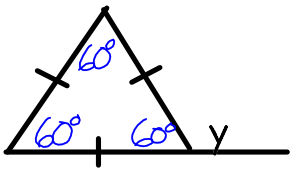
$\boxed{y=155°}$

$25+25+z=180$

$50+z=180$

$\boxed{z=130}$

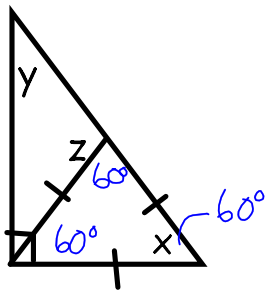
d)



$y = 180 - 60$ (ETT, SAT)

$= 120°$

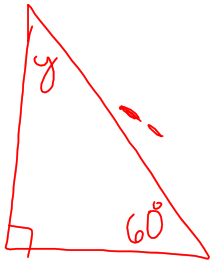
e)



$x = 60°$ (ETT)

$z = 180 - 60°$ (SAT)

$z = 120°$



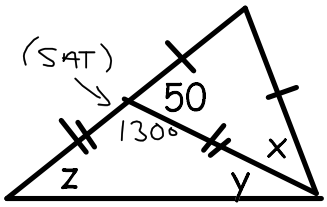
$60 + 90 + y = 180$

$150 + y = 180$

$y = 180 - 150$

$y = 30$

f)



$x = 50°$ (ITT)

$z + y + 130 = 180$

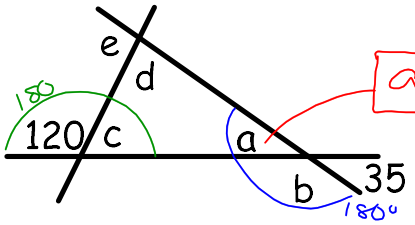
$z + y = 50$

$(z = y$, ITT$)$

$z = 25$

$y = 25$

g)



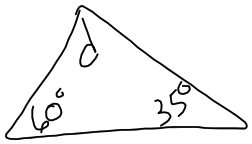
$a = 35°$ (OAT)

$120 + c = 180$ (SAT)

$c = 60°$

$35 + b = 180$

$b = 145°$



$60 + 35 + d = 180$

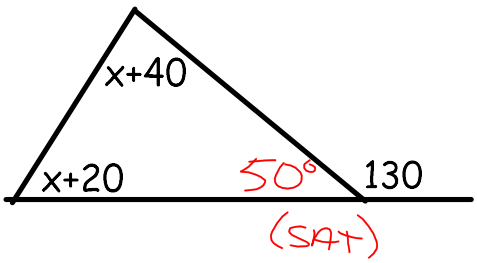
$95 + d = 180$

$d = 85°$

$e + 85 = 180$

$e = 95°$

h)



(SAT)

$x + 20 + x + 40 + 50 = 180$

$2x + 110 = 180$

$2x = 180 - 110$

$\frac{2x}{2} = \frac{70}{2}$

$x = \frac{70}{2}$

$x = 35$