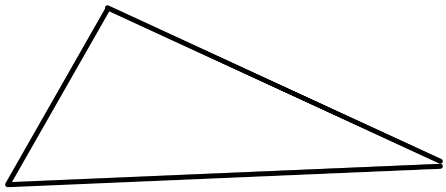
Geometry!

Law of Sines

SSA, ASA, AAS

Law of Cosines

SSS, SAS

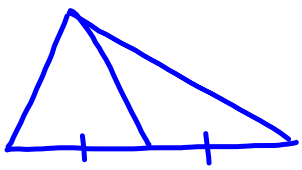


Just trig

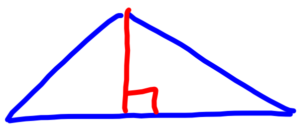
right triangles

Name some lines that go through the vertices/edges of a triangle.

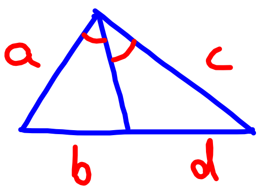
Median



Altitude

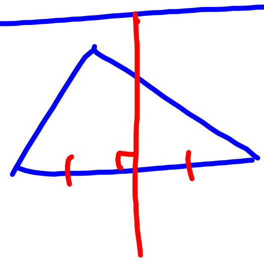


Angle Bisector



$\frac{a}{b} = \frac{c}{d}$

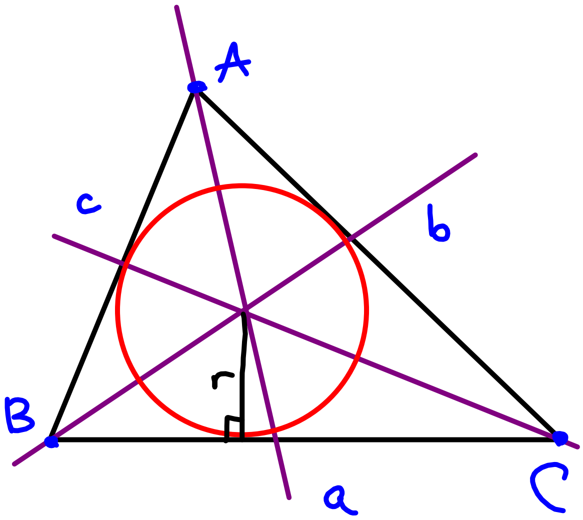
Perpendicular Bisector



The intersection of all three angle bisectors of a triangle is called the incenter (center of inscribed circle).

$[\Delta ABC] = \frac{1}{2} r(a+b+c)$

$r =$ inradius

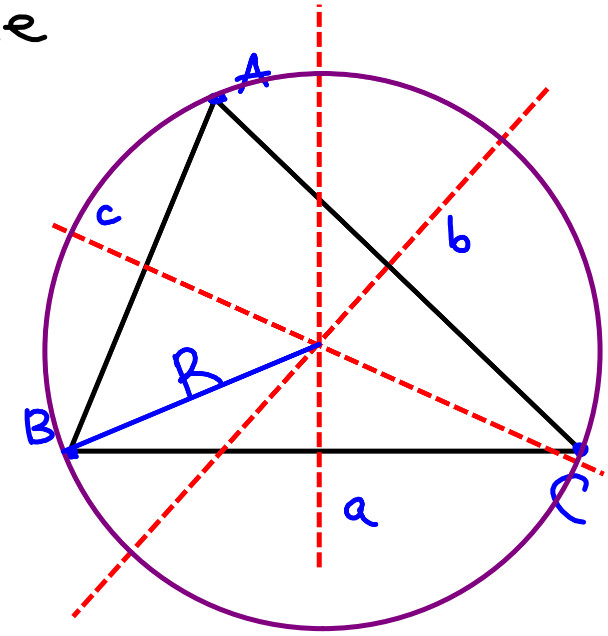


The intersection of the three perpendicular bisectors of a triangle is the circumcenter (center of the circumscribed circle).

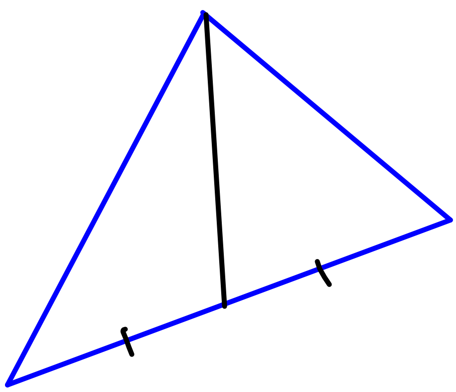
$2R = \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

$R =$ circumradius

Extended Law of Sines

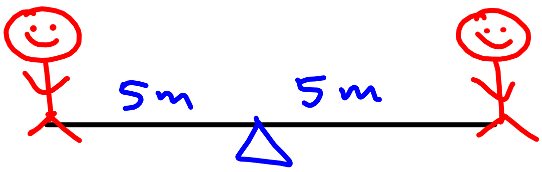


The intersection of the three medians of a triangle is called the centroid (center of mass).



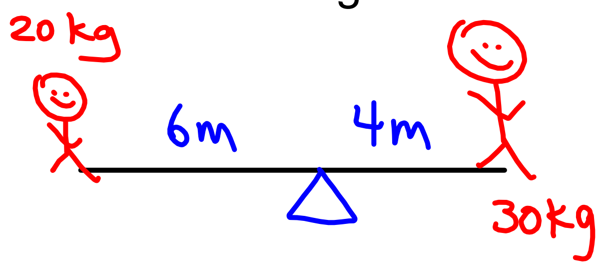
Balancing on a See-Saw

A see-saw is 10 m long. Two 30 kg children are sitting at the two ends. Where should the fulcrum go in order for the see-saw to be balanced?



Same see-saw, but now there is a 20 kg child and a 30 kg child. Where should the fulcrum go in order for the see-saw to be balanced?

10 m



Torque

$r_1 m_1 = r_2 m_2$

$20(6) = 30(4)$

$20x = 30(10-x)$

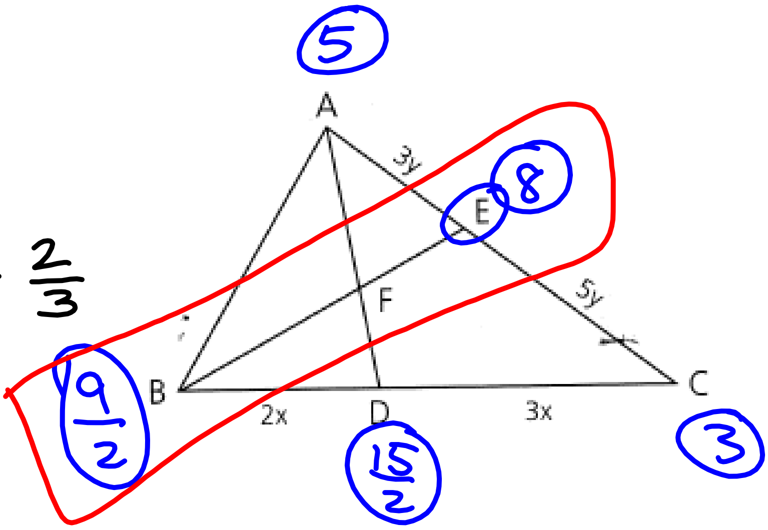
A cevian is any line segment in a triangle with one endpoint on a vertex of the triangle and the other endpoint on the opposite side. Medians, altitudes, and angle bisectors are special cases of cevians.

The name *cevian* comes from the mathematician Giovanni Ceva, who proved a well known theorem about cevians which also bears his name.

The study of using cevians and balancing a triangle is called mass points.

Given: Diagram as marked

Find: $\frac{BF}{FE}$



$\frac{AE}{EC} = \frac{3}{5}$, $\frac{BD}{DC} = \frac{2}{3}$

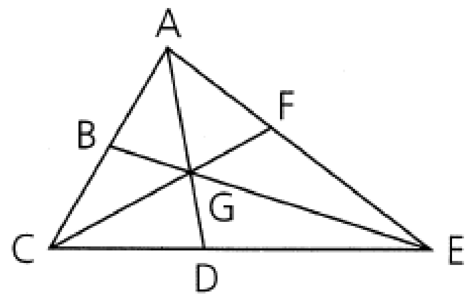
$BF\left(\frac{9}{2}\right) = FE(8)$

$\frac{BF}{FE} = \frac{8}{\frac{9}{2}} = 8 \cdot \frac{2}{9} = \frac{16}{9}$

$5AF = \frac{15}{2} FD$

$\frac{AF}{FD} = \frac{15}{2} \cdot \frac{1}{5} = \frac{3}{2}$

In the figure shown, $\frac{AB}{BC} = \frac{3}{4}$ *and* $\frac{CD}{DE} = \frac{2}{5}$*. Find* $\frac{CG}{GF}$.



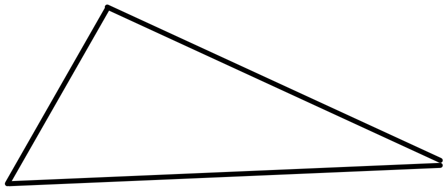
Find AG:GD.

If the area of triangle ACE is 100:

1. What is the area of triangle ACD?

2. What is the area of triangle CDG?

Geometry!



Law of Cosines

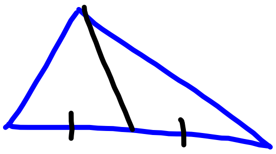
SSS, SAS

Law of Sines

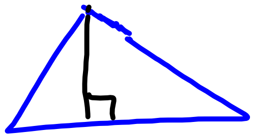
SSA, AAS, ASA

Name some line segments that go through the vertices/ edges of a triangle.

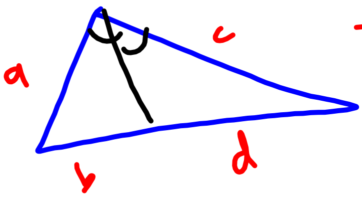
Median



Altitude

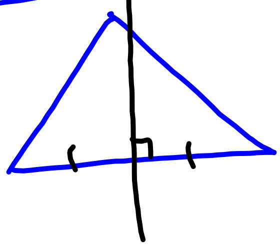


Angle Bisector



$$\frac{a}{b} = \frac{c}{d}$$

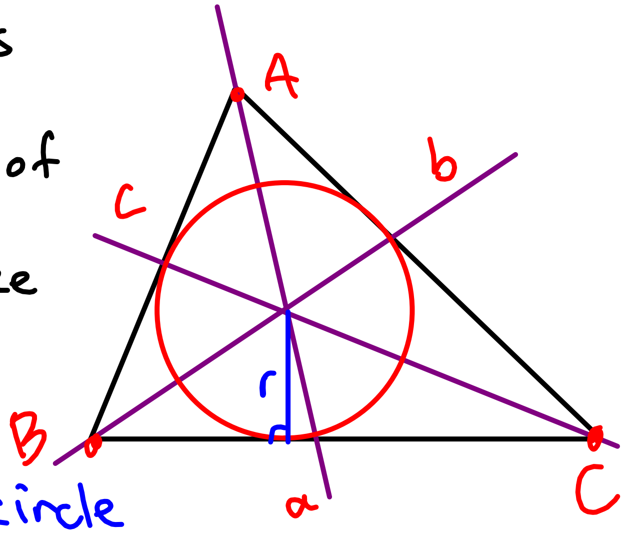
Perpendicular Bisector



The three angle bisectors of a triangle intersect at the incenter (center of inscribed circle and is equidistant from all three sides).

$[\Delta ABC] = \frac{1}{2} r(a+b+c)$

r = radius of inscribed circle

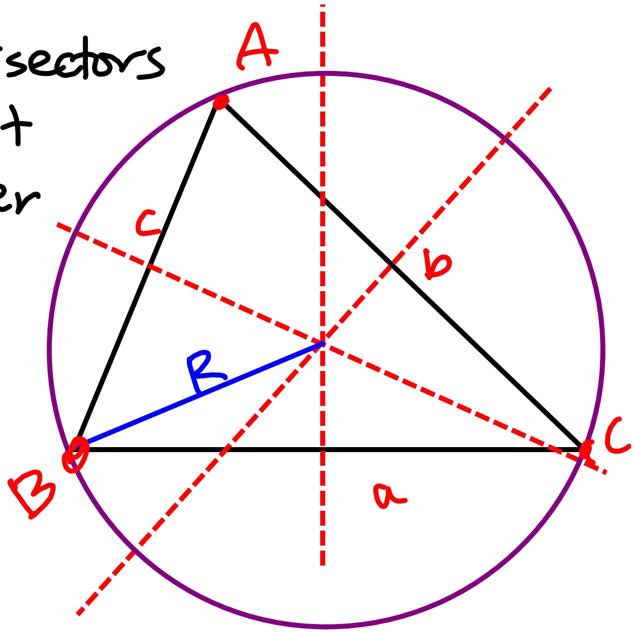


The three perpendicular bisectors of a triangle intersect at the circumcenter (center of the circumcircle and is equidistant from all three vertices).

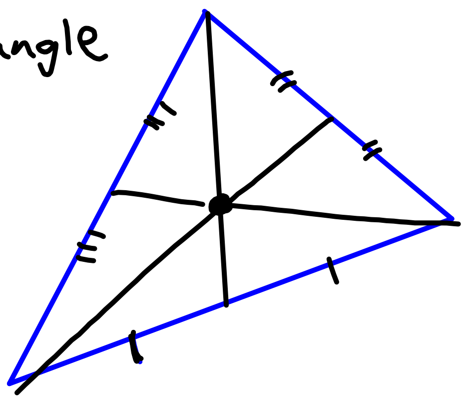
Extended Law of Sines

$2R = \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

R = radius of circumcircle

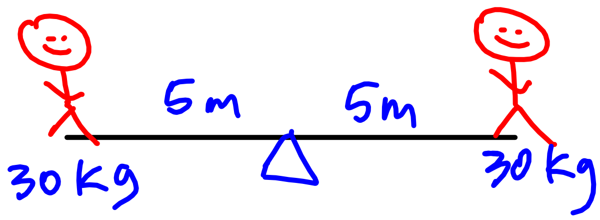


The three medians of a triangle intersect at the centroid (center of mass).

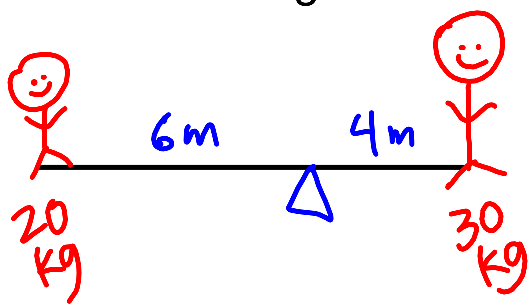


Balancing on a See-Saw

A see-saw is 10 m long. Two 30 kg children are sitting at the two ends. Where should the fulcrum go in order for the see-saw to be balanced?



Same see-saw, but now there is a 20 kg child and a 30 kg child. Where should the fulcrum go in order for the see-saw to be balanced?



Torque

$20(6) = 30(4)$

A *cevian* is any line segment in a triangle with one endpoint on a vertex of the triangle and the other endpoint on the opposite side. Medians, altitudes, and angle bisectors are special cases of cevians.

The name *cevian* comes from the mathematician Giovanni Ceva, who proved a well known theorem about cevians which also bears his name.

The study of using cevians and balancing a triangle is called <u>mass points.</u>

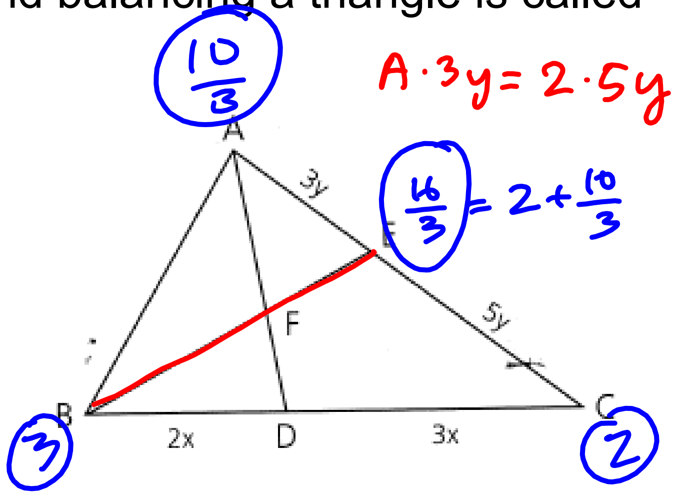
Given: Diagram as marked

Find: $\frac{BF}{FE}$

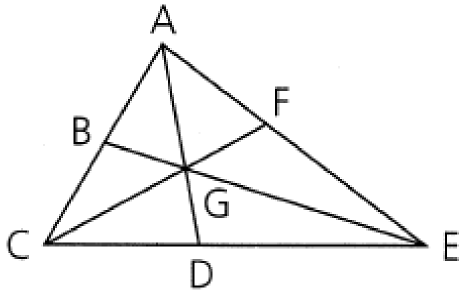
$\frac{AE}{EC} = \frac{3}{5}$ $\frac{BD}{DC} = \frac{2}{3}$

$3\,BF = \frac{16}{3}\,FE$

$\boxed{\frac{BF}{FE} = \frac{16}{9}}$



In the figure shown, $\frac{AB}{BC} = \frac{3}{4}$ *and* $\frac{CD}{DE} = \frac{2}{5}$. *Find* $\boxed{\frac{CG}{GF}}$. $= \frac{26}{15}$



Find $\boxed{AG:GD}$. $= \frac{21}{20}$

If the area of triangle ACE is 100:

1. What is the area of triangle ACD?

2. What is the area of triangle CDG?