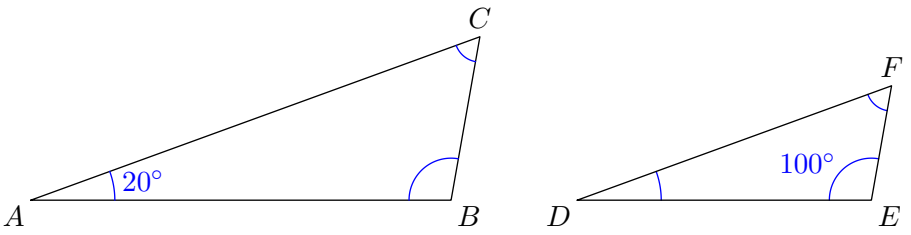
## Oppgaver for kapittel 0

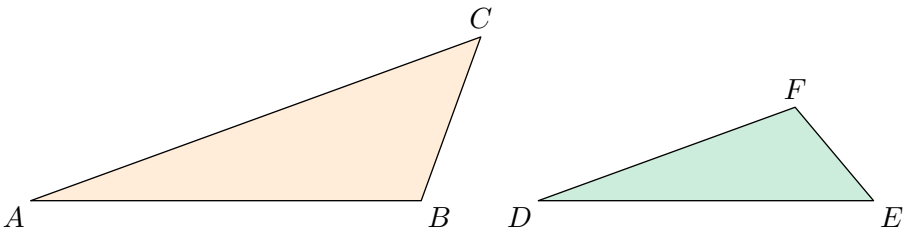
### 0.1.1

The triangles are similar. Find the value of $\angle ACB$.



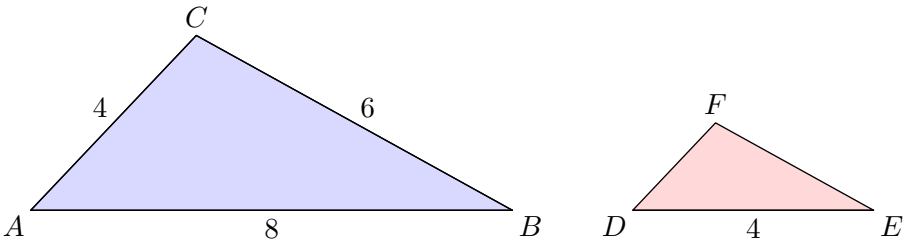

### 0.1.2

The triangles are similar. Find the three pairs of corresponding sides.



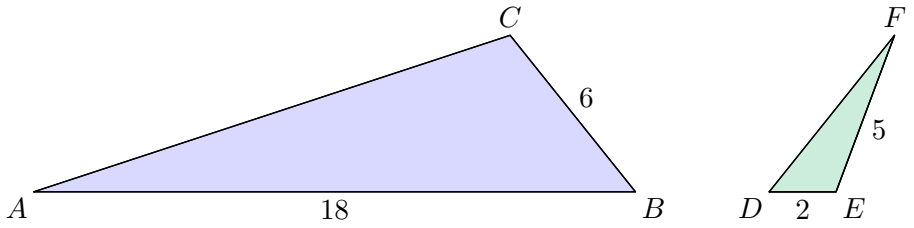

### 0.1.3

The triangles are similar. Find the length of $EF$ and the length of $DF$.



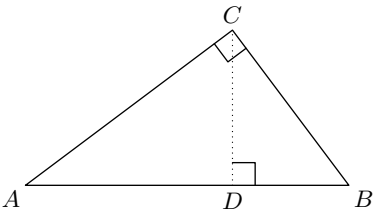
### 0.1.4

The triangles are similar. Find the length of $AC$ and the length of $DF$.




### 0.1.5

Find all the similar triangles defined by $A$, $B$, $C$ og $D$.

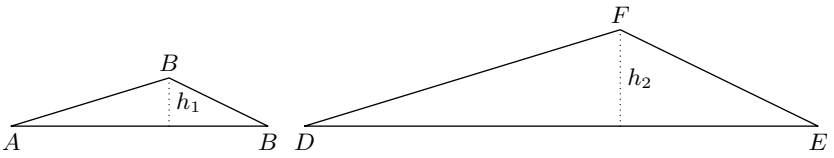



### 0.1.6

$\triangle ABC$ and $\triangle DEF$ are similar.

a) What is the ratio of the area of $\triangle DEF$ to the area of $\triangle ABC$ if $h_1 = 2$ and $h_2 = 6$?

b) Given a number $a$. What is the ratio of the area of $\triangle DEF$ to the area of $\triangle ABC$ if $h_2 = ah_1$?



### 0.1.7

En kjegle has radius 10 and height 4.

a) Find the surface area of the cone.

b) Find the volume of the cone.5

### 0.1.8

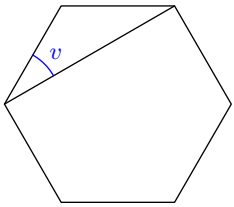
a) Two spheres have radii 2 and 6, respectively. What is the ratio of the volume of the larger sphere to the volume of the smaller sphere?

b) A sphere has radius $r$, and a another sphere has radius $ar$, where $a > 1$. What is the ratio of the volume of the larger sphere to the volume of the smaller sphere?

## Gruble 1

(GV21D1)

The polygon is a regular[1] hexagon. Find the value of $v$.

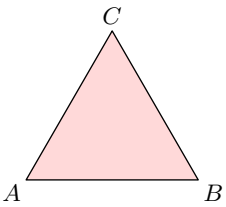



## Gruble 2

Given an isosceles triangle $\triangle ABC$, with $AC = BC$. Prove that[2] the bisector of $\angle ACB$ is the perpendicular bisector of $AB$.

## Gruble 3

$\triangle ABC$ is equilateral and have sides of length $s$.




a) Prove that in a triangle with angles 30°, 60°, 90°, the hypotenuse i twice as long as the shortest leg.

b) Prove that the height of $\triangle ABC$ is $\frac{\sqrt{3}}{2}s$.

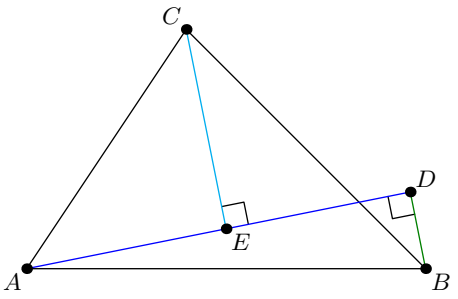
[1] Regular polygons have sides of equal length.

[2] The definition of the bisector of an angle and the perpendicular bisector of a segment is found in TM1.

## Gruble 4

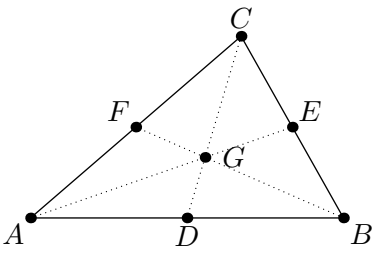
Prove that the double area of $\triangle ABC$ can be written as

$$AE \cdot BD + CE \cdot AD$$




## Gruble 5

A **median** of a triangle is a segment joining a vertex to midpoint of the opposite side.




Given $\triangle ABC$ with medians $AE$, $BF$ and $CD$.

a) Prove that $AE$, $BF$ and $CD$ intersect at exactly one point ($G$ in the figure).

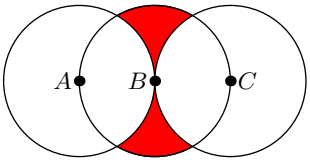
b) Prove that

$$\frac{GC}{DG} = \frac{GB}{FG} = \frac{GA}{EG} = 2$$

*Note:* Part b) is probably easier than part a).

## Gruble 6

The tree circles have radius 2, and $A$, $B$ and $C$ lie on the same line. Find the area of the red surface.

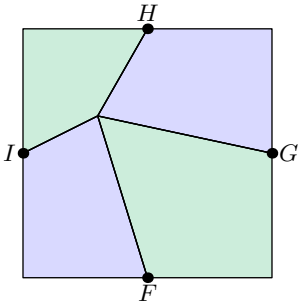



Hint: You could get use of the fact that a sector with angle $v$ makes up $\frac{a}{360°}$ of the area of a circle with equal radius.

## Gruble 7

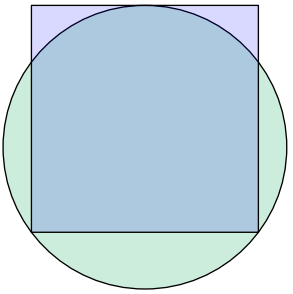
The colored surfaces makes up a square, and $F$, $G$, $H$ and $I$ are, respectively, the square's midpoints.

Prove that the area of the blue surface equals the area of the green surface.



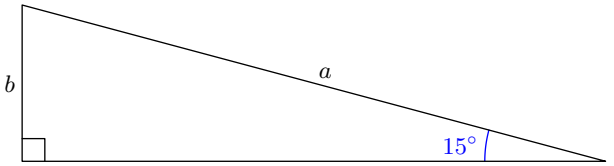

## Gruble 8

The square has sides of length 4. Find the radius of the circle.



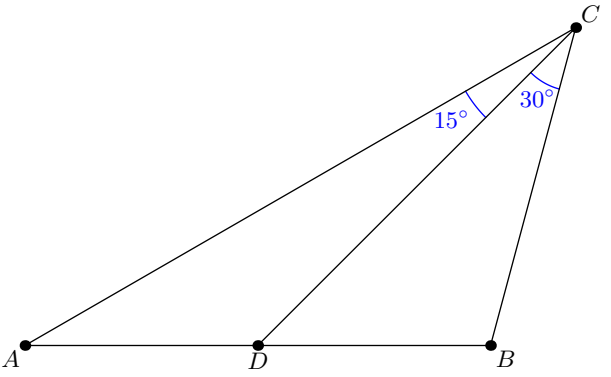
## Gruble 9

a) Prove that $\frac{a}{b} = \sqrt{2} + \sqrt{6}$.




*Note:* To solve this problem you may (bot far from necessarily) need the *abc*-formula found in TM1.

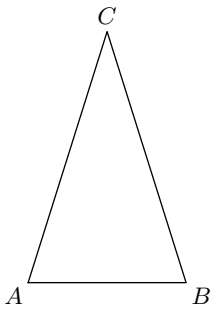
b) $AD = BC$. Find the value of $\angle A$.



## Gruble 10

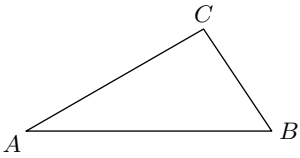
*Note:* This exercise deals with results that at first seems obvious, but turns out rather har to prove.

a) Prove that if $AC = BC$, then $\angle A = \angle B$.



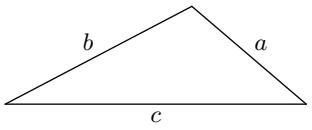

*Note*: Earlier on, we have declared that an isosceles triangle has two equal angles, but strictly we have to prove it.

b) Prove that if $AC > BC$, then $\angle B > \angle C$.




c) Given $\triangle ABC$, where $AB$ is the longest side. Prove that when $AB$ is the base, the height lies inside the triangle.

d) In the figure below, $c$ is the longest side of the triangle.




Prove that

$$c > a + b \quad , \quad b + c > a \quad , \quad a + c > b$$

*Note*: These three inequalities are called the **triangle inequality**.