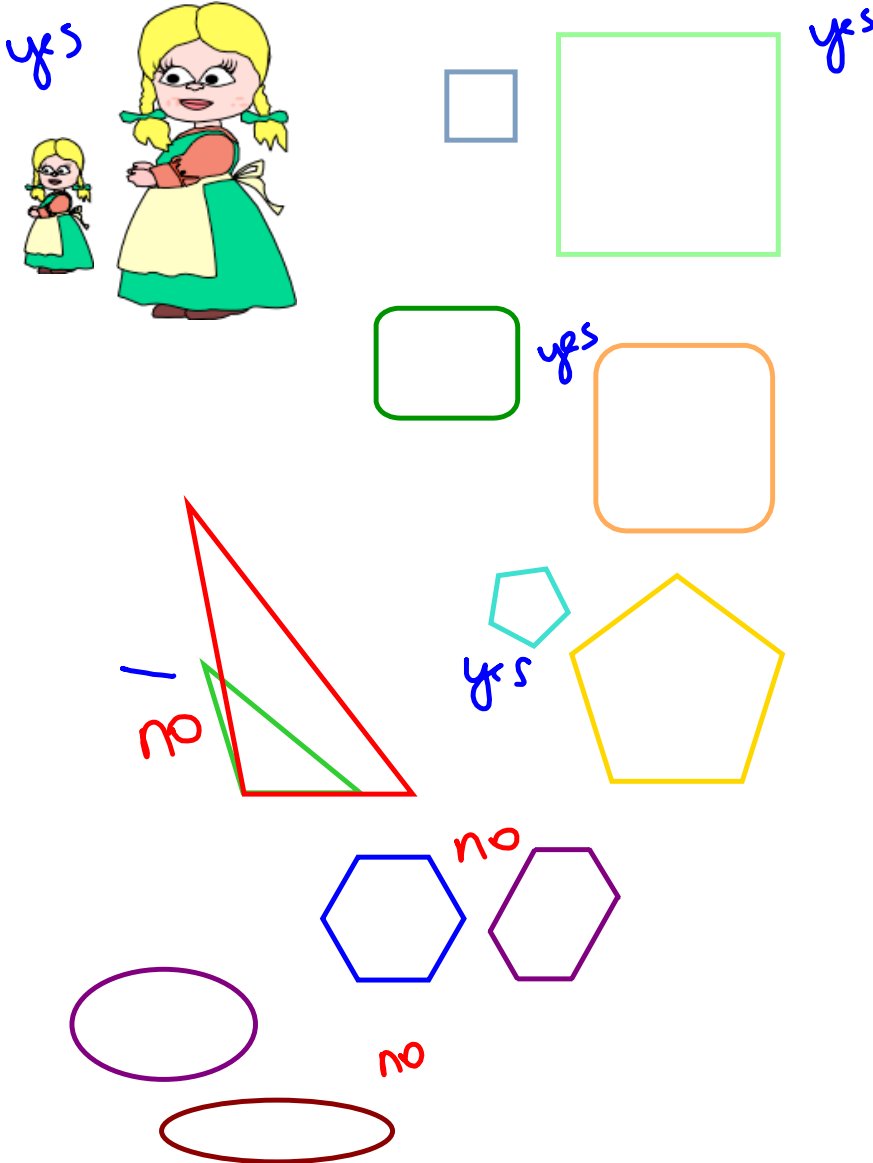## 12.4 Similarity

What does it
mean to be similar?

Similar or not?

<u>True or False?</u>

All squares are similar to each other.   *true*

All isosceles triangles are similar to each other.   *false*

All Pentagons with congruent angles are similar to each other.   *true*

All rectangles are similar to each other.   *false*

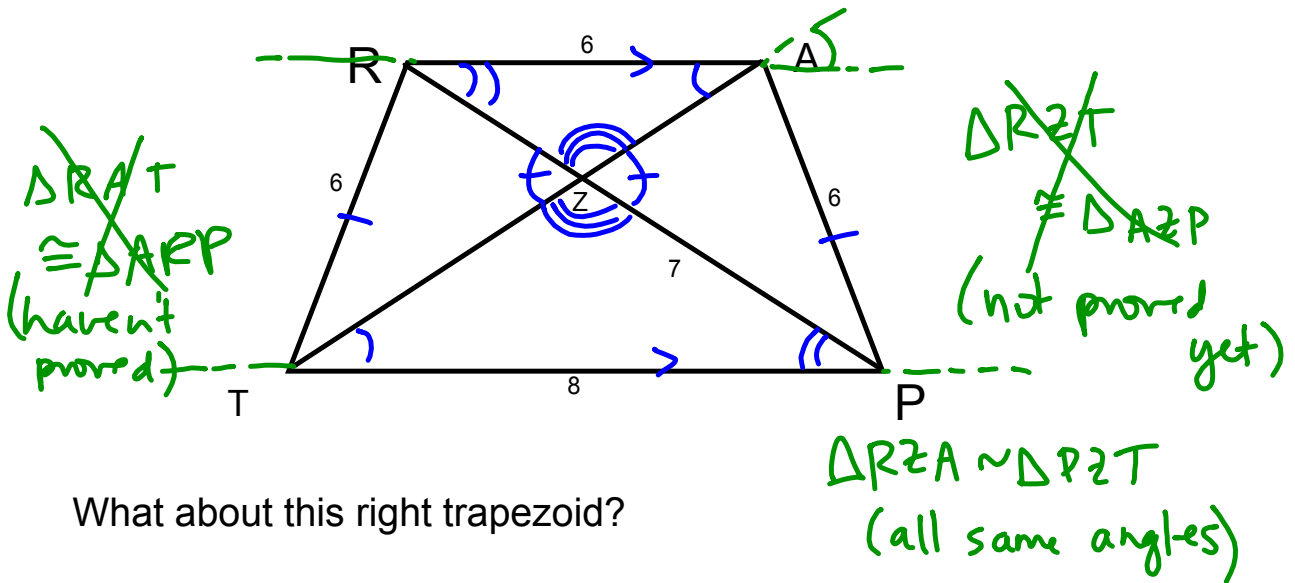All isosceles trapezoids are similar to each other.   *false*

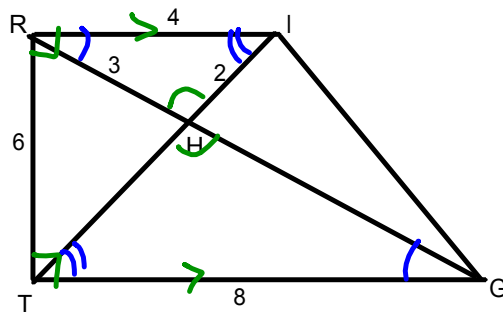All regular hexagons are similar to each other.   *true*

All circles are similar to each other.   *true*

All rhombi are similar to each other.   *false*

Are there any similar triangles in this Isosceles trapezoid?

ΔRAT
≅ΔARP
(haven't
proved)

ΔRZT
≇ΔAZP
(not proved
yet)

ΔRZA ∼ΔPZT
(all same angles)

What about this right trapezoid?

ΔRIH ∼ Δ GTH

Similarity Theorems

AA : (angle angle) two corresponding angles
are ≅ , then Δs are similar

SSS : (side, side, side) all 3 corresponding sides in
the 2 Δs are proportional w/ same
scaling factor

SAS (side, angle, side w/ angle included bet.
2 sides)

if 2 corresponding sides are proportional
w/ same scaling factor and the included
angles are ≅.
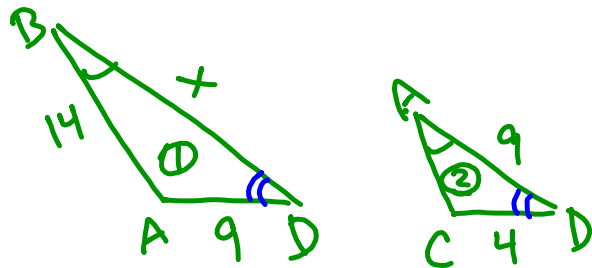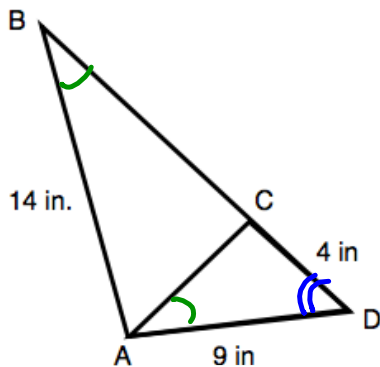
In the ABOVE figure, if angle ABC is congruent to angle CAD, how long is BC?

$BC = BD - 4$

$\triangle BAD \sim \triangle ACD$ by AA.

$\dfrac{x}{9} = \dfrac{9}{4}$ or $\dfrac{x}{9} = \dfrac{9}{4}$
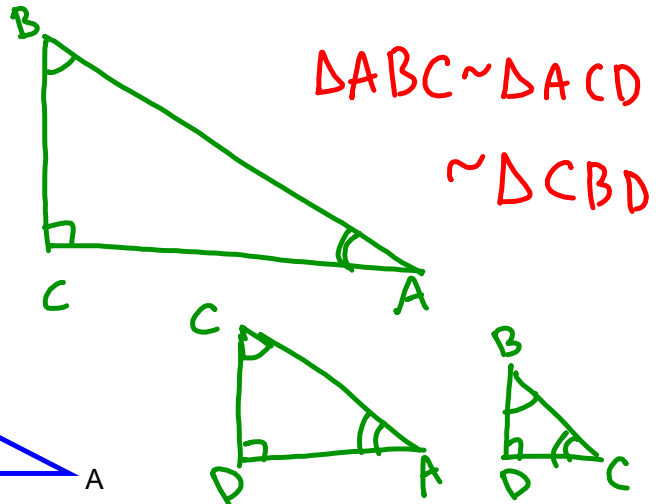
$x = \dfrac{81}{4} = 20.25$

$BC = 20.25 - 4 = \boxed{16.25 \text{ in}}$

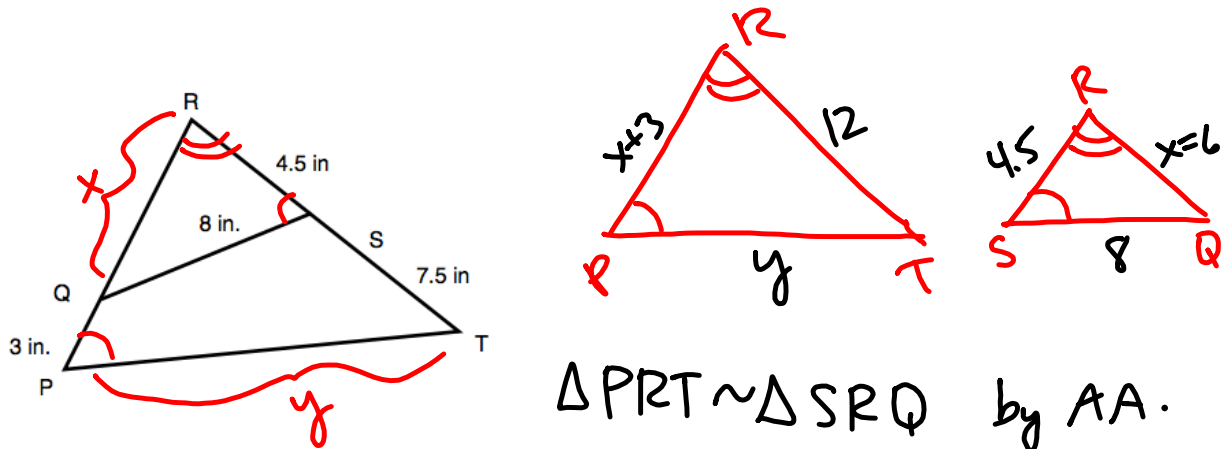How many similar triangles are there in this picture?

$\triangle ABC \sim \triangle ACD$

$\sim \triangle CBD$
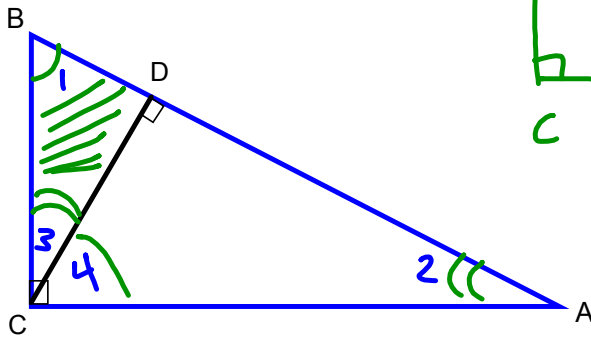
$m\angle 1 + m\angle 2 = 90°$

from $\triangle BDC$, $m\angle 1 + m\angle 3 = 90°$

$\Rightarrow m\angle 2 = m\angle 3$

$\triangle PRT \sim \triangle SRQ$ by AA.

In the ~~|~~ ABOVE figure, if angle RSQ is congruent to angle RPT, how long are RQ and PT?

$$① \quad x\left(\frac{12}{x}\right) = \left(\frac{x+3}{4.5}\right)x$$

$$4.5(12) = \left(\frac{(x+3)x}{4.5}\right)4.5$$

$$54 = (x+3)x$$

$$54 = x^2 + 3x$$

$$0 = x^2 + 3x - 54$$
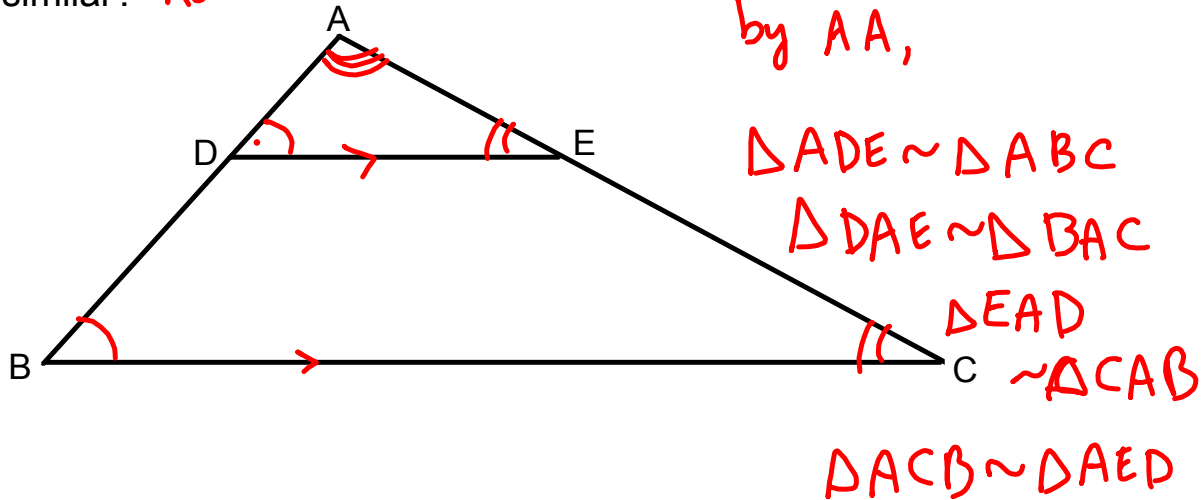
$$0 = (x+9)(x-6)$$

$$x+9 = 0 \quad \text{or} \quad x-6 = 0$$

$$\cancel{x = -9} \quad \text{or} \quad \boxed{x = 6} \text{ in.}$$
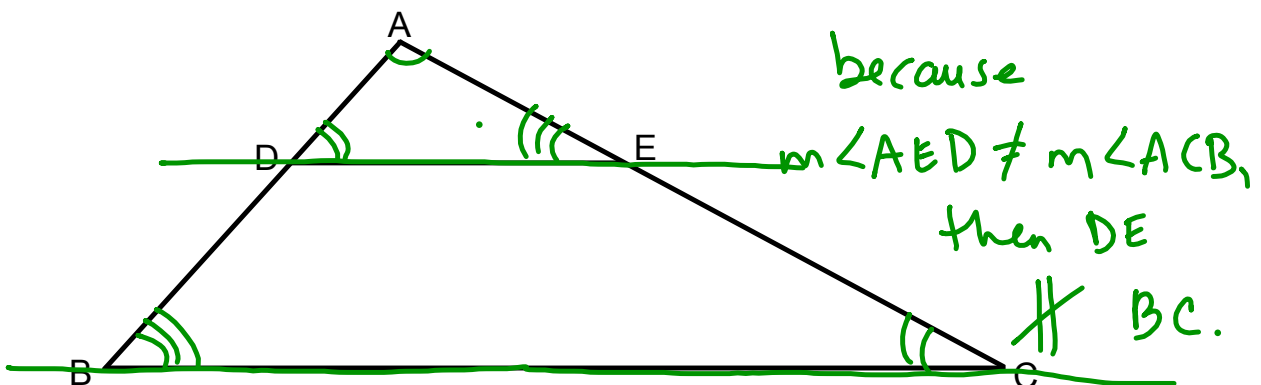
$$② \quad \frac{12}{6} = \frac{y}{8}$$

$$2(8) = y$$

$$\boxed{y = 16 \text{ in}}$$

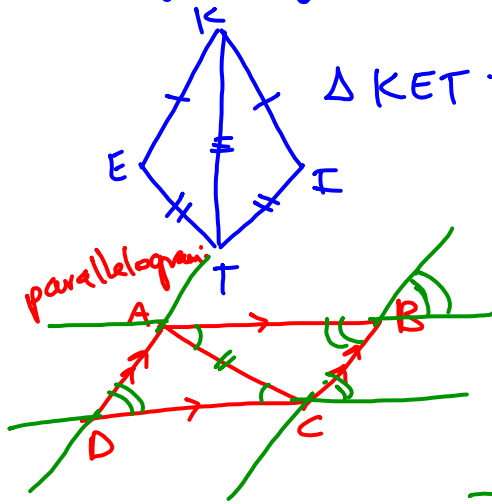1. If we know segment DE is parallel to segment BC, are triangles ADE and ACB similar? no

A

D   E

B   C

by AA,

$\triangle ADE \sim \triangle ABC$

$\triangle DAE \sim \triangle BAC$

$\triangle EAD$

$\sim \triangle CAB$

$\triangle ACB \sim \triangle AED$

2. If we know triangles ADE and ACB are similar, is segment DE parallel to segment BC?

A

D   E

B   C

$\triangle ADE \sim \triangle ACB$

because

$m\angle AED \neq m\angle ACB$,
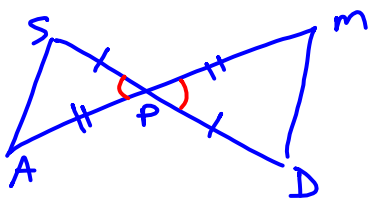
then DE

$\cancel{\parallel}$ BC.
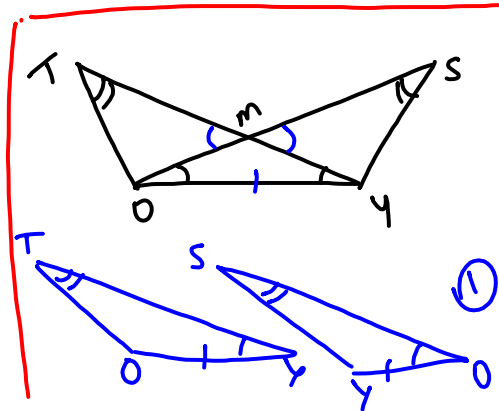
HW

Congruency/Similarity Wksht:

$\triangle KET \cong \triangle KIT$ by SSS.

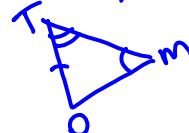parallelogram
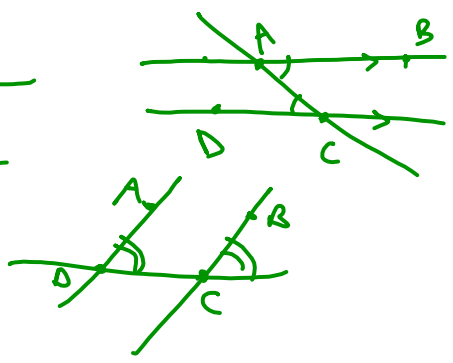
by AAS,
$\triangle BAC \cong \triangle DCA$
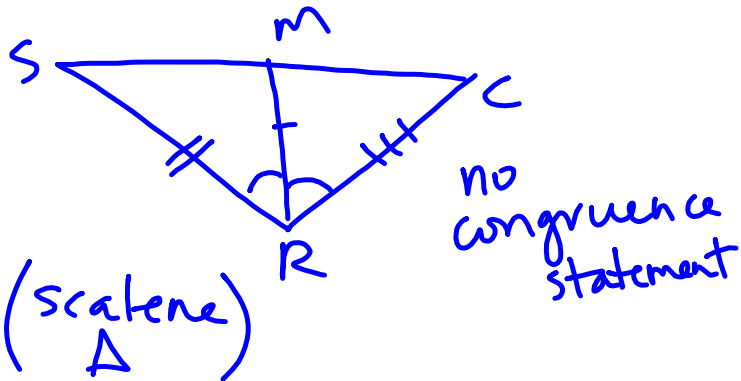
$\triangle SPA \cong \triangle DPm$
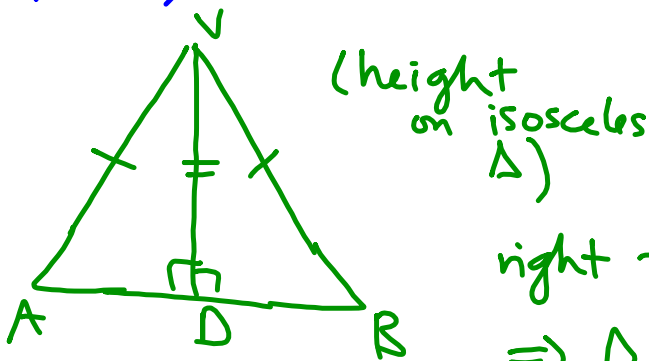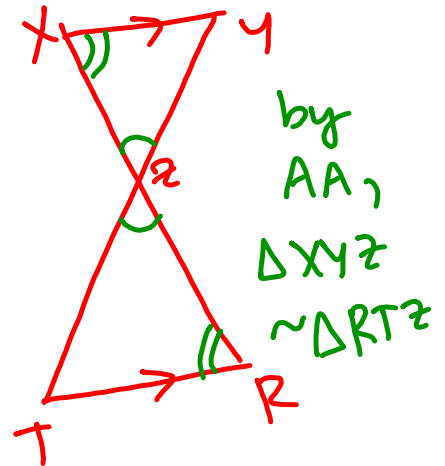by SAS

①

by AAS,
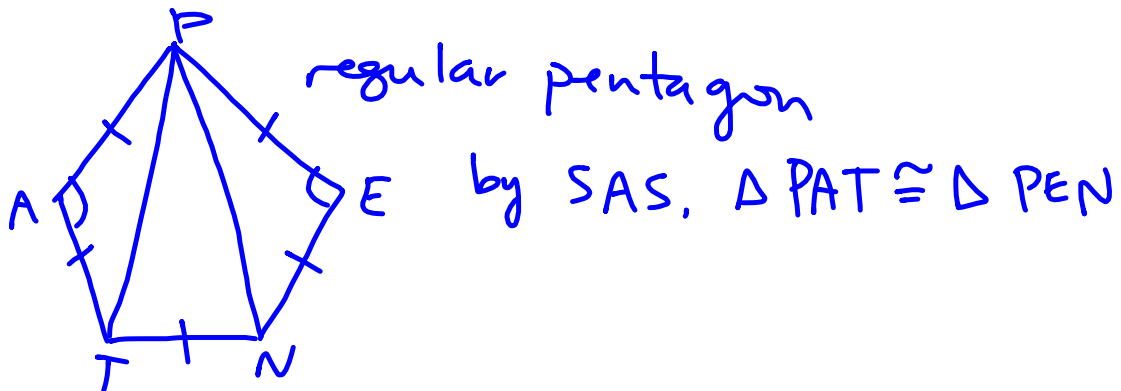$\triangle TOY \cong \triangle SYO$

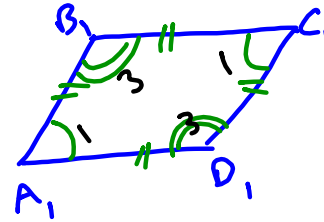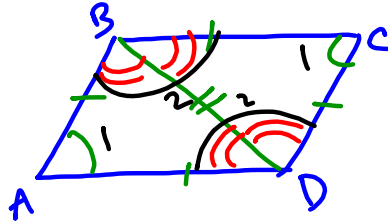$\Rightarrow TO = SY$

by AAS, $\triangle TMO \cong$
$\triangle SMY$

S M C
R

no
congruence
statement

(scalene)
Δ

X Y
x
by
AA,
ΔXYZ
~ΔRTZ
T R

V
(height
on isosceles
Δ)

A D B

right triangle SSA case
⇒ ΔAVD ≅ ΔBVD

P
regular pentagon

A E
by SAS, Δ PAT ≅ Δ PEN

T N

12.4 #1

by SSS, $\triangle ABD \cong \triangle CBD$
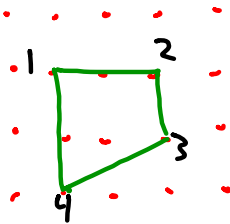
$\Rightarrow m\angle A = m\angle C$

$2m\angle 1 + 2m\angle 2 = 360°$

and $2m\angle 1 + 2m\angle 3 = 360°$

$\Rightarrow m\angle 2 = m\angle 3$

all corresponding angles
are same $\Rightarrow$ rhombi are similar

Dilation   scale by $\frac{4}{3}$

$2\left(\frac{4}{3}\right) = \frac{8}{3}$

$= 2\frac{2}{3}$