Areas

Monday, January 22, 2024 6:10 AM

1.1 SSS, ASA, AAS, SAS, HL

1.2

$\angle ACB = \angle DFE$

or

$\angle BAC = \angle EDF$

1.3

$z + 40^\circ + 112^\circ = 180^\circ$

$z = 28^\circ$

$x = z = 28^\circ$

$y = 180^\circ - 40^\circ - z = 112^\circ$

1.4

$\angle OBC = \angle OCB = \angle OCD$

(Isosceles triangle)

Let $\angle OBC = x$, $24^\circ + 3x = 180^\circ$

$x = 52$

$\angle BOC = 180^\circ - 2x = 76^\circ$

2.1 side length $= \frac{36}{3} = 12$

2.2 $8\sqrt{3} + 8 + 8 = 16 + 8\sqrt{3}$

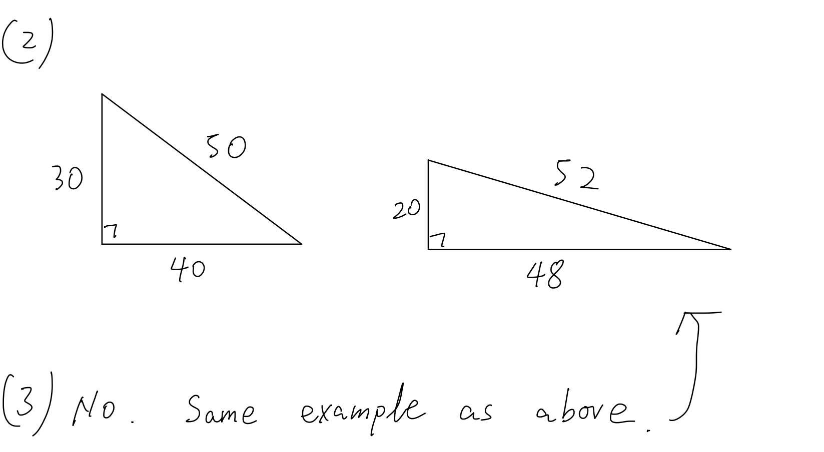
2.3

(1) If $\triangle ABC \cong \triangle A'B'C'$, then

$$\begin{cases} AB = A'B' \\ AC = A'C' \\ BC = B'C' \end{cases}$$

So $AB + AC + BC = A'B' + A'C' + B'C'$

(2)

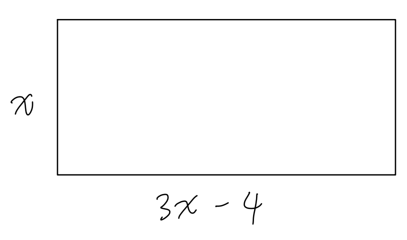


(3) No. Same example as above.

3.1 20

3.2 $\left(\frac{36}{4}\right)^2 = 81$

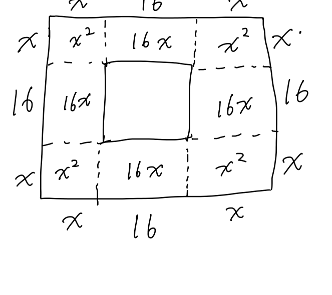
3.3



$(x + (3x - 4)) \times 2 = 64$, $x = 9$

Area $= x(3x - 4) = 9 \times 24 = 216$

3.4 Side of garden: $\frac{64}{4} = 16$



$4x^2 + 4(16x) = 228$

$x^2 + 16x - 57 = 0$

$x = 3$

So Side length of outer edge $= 16 + 2x$
$= 22$

Perimeter $= 4 \times 22 = 88$

3.5

Area = 10 since a right triangle is half of a rectangle.

Formula: Area $= \frac{1}{2}$ base $\times$ height

3.6

$$XW = \frac{\frac{1}{2} \times 6 \times 8}{\frac{1}{2} \times 10} = 4.8$$

3.7 (1) Since $ABDC$ is a parallelogram,

$AE = BF = h$

$AC = BD$

So $\triangle ACE \cong \triangle BDF$ by HL

(2) Use bracket [ ] to denote area.

$$\begin{aligned} [ABDC] &= [ACE] + [AEDB] \\ &= [BDF] + [AEDB] \\ &= [AEFB] \end{aligned}$$

Area = base $\times$ height

3.8

Suppose the side lengths are a and b. Then

$2(a+b) = 100$, $b = 50 - a$

Now let a be the base. Let h be the corresponding height. Then

Area $= ah$.

Fix a. Note that h always less than or equal to b, so

Max Area $= ab = a(50 - a)$
$= 50a - a^2$

Note that $50a - a^2$ maximizes at $a = 25$, so the area is maximized when

$a = 25$, $b = h = 50 - a = 25$

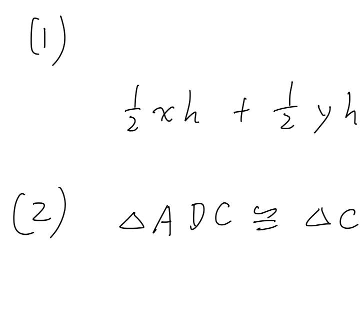
This is a square.

3.9 (1)

$\frac{1}{2}xh + \frac{1}{2}yh = \frac{1}{2}(x+y)h$

(2) $\triangle ADC \cong \triangle CBA$

3.10



$[MENF] = \frac{1}{4} S$