



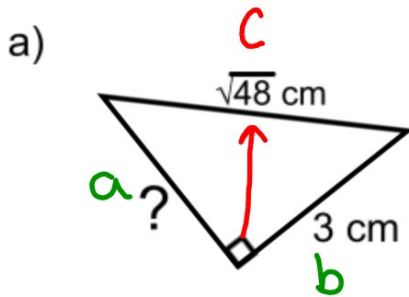
## Warm Up Grade 8

Date:

$$C^2 = a^2 + b^2$$

$$\text{or } a^2 = c^2 - b^2$$

Find the length of the missing side (Use calculators but show your work)



Given

$$a = ?$$

$$b = 3 \text{ cm}$$

$$c = \sqrt{48} \text{ cm}$$

$$a^2 = c^2 - b^2$$

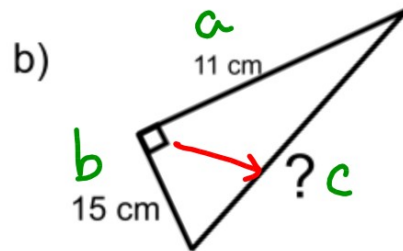
$$a^2 = (\sqrt{48} \text{ cm})^2 - (3 \text{ cm})^2$$

$$a^2 = 48 \text{ cm}^2 - 9 \text{ cm}^2$$

$$a^2 = 39 \text{ cm}^2$$

$$\sqrt{a^2} = \sqrt{39 \text{ cm}^2}$$

$$a \approx 6.2 \text{ cm}$$



Given  $a = 11 \text{ cm}$

$b = 15 \text{ cm}$

$c = ?$

$$c^2 = a^2 + b^2$$

$$c^2 = (11 \text{ cm})^2 + (15 \text{ cm})^2$$

$$c^2 = 121 \text{ cm}^2 + 225 \text{ cm}^2$$

$$c^2 = 346 \text{ cm}^2$$

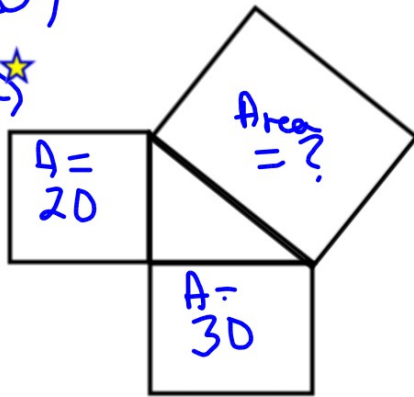
$$\sqrt{c^2} = \sqrt{346 \text{ cm}^2}$$

$$c \approx 18.6 \text{ cm}$$

Homework solutions

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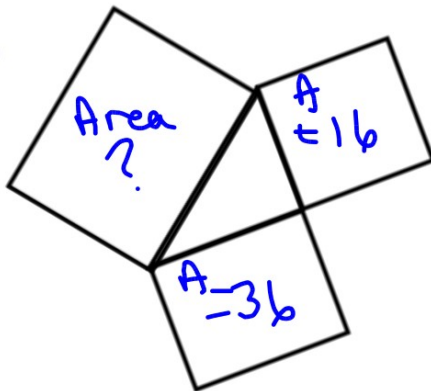
3a) 



Missing Area  
 $20 + 30 = 50$

$A = 50$   
 Side Length =  $\sqrt{50}$

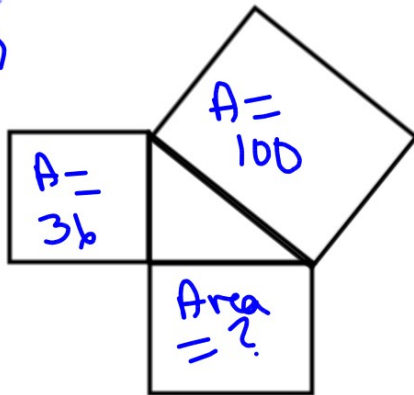
b)



Missing Area  
 $16 + 36 = 52$

$A = 52$   
 Side Length =  $\sqrt{52}$

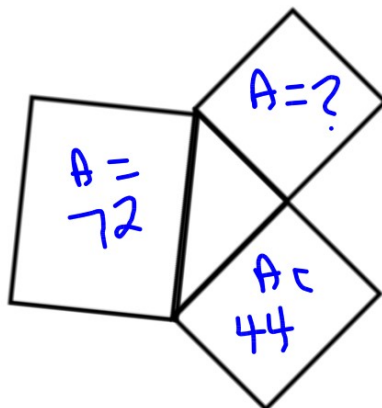
4a) 



Missing Area  
 $100 - 36 = 64$

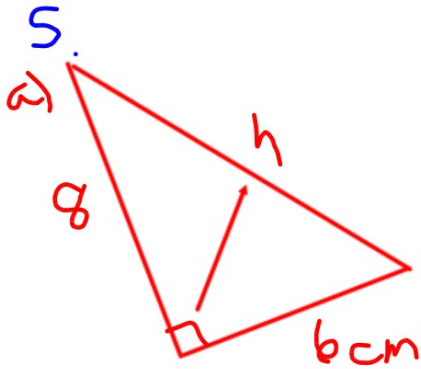
$A = 64$   
 Side Length =  $\sqrt{64} = 8$

b)



Missing Area  
 $72 - 44 = 28$

$A = 28$   
 Side Length =  $\sqrt{28}$



$$c^2 = a^2 + b^2$$

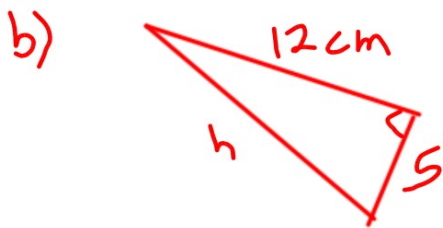
$$c^2 = 8^2 + 6^2$$

$$c^2 = 64 + 36$$

$$c^2 = 100$$

$$\sqrt{c^2} = \sqrt{100}$$

$$c = 10 \text{ cm}$$



$$c^2 = a^2 + b^2$$

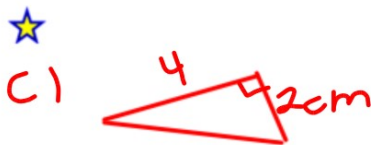
$$c^2 = 12^2 + 5^2$$

$$c^2 = 144 + 25$$

$$c^2 = 169$$

$$\sqrt{c^2} = \sqrt{169}$$

$$c = 13 \text{ cm}$$



$$c^2 = a^2 + b^2$$

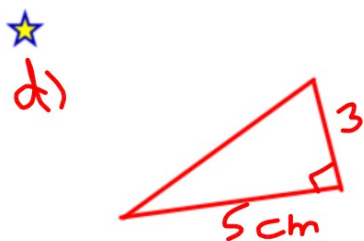
$$c^2 = 4^2 + 2^2$$

$$c^2 = 16 + 4$$

$$c^2 = 20$$

$$\sqrt{c^2} = \sqrt{20}$$

$$c = 4.5 \text{ cm}$$



$$c^2 = a^2 + b^2$$

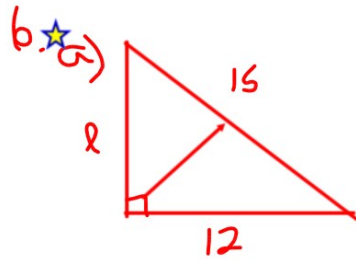
$$c^2 = 5^2 + 3^2$$

$$c^2 = 25 + 9$$

$$c^2 = 34$$

$$\sqrt{c^2} = \sqrt{34}$$

$$c = 5.8 \text{ cm}$$



$$c^2 = a^2 + b^2$$

$$15^2 = a^2 + 12^2$$

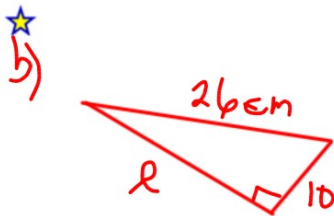
$$225 = a^2 + 144$$

$$225 - 144 = a^2 + 144 - 144$$

$$81 = a^2$$

$$\sqrt{81} = \sqrt{a^2}$$

$$9 = a$$



$$c^2 = a^2 + b^2$$

$$26^2 = a^2 + 10^2$$

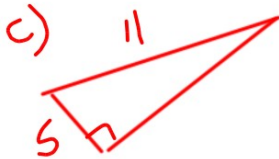
$$676 = a^2 + 100$$

$$676 - 100 = a^2 + 100 - 100$$

$$576 = a^2$$

$$\sqrt{576} = \sqrt{a^2}$$

$$24 = a$$



$$c^2 = a^2 + b^2$$

$$11^2 = a^2 + 5^2$$

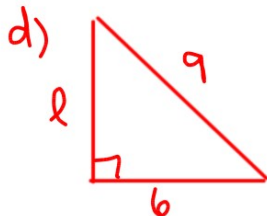
$$121 = a^2 + 25$$

$$121 - 25 = a^2 + 25 - 25$$

$$96 = a^2$$

$$\sqrt{96} = \sqrt{a^2}$$

$$9.8 = a$$



$$c^2 = a^2 + b^2$$

$$9^2 = a^2 + 6^2$$

$$81 = a^2 + 36$$

$$81 - 36 = a^2 + 36 - 36$$

$$45 = a^2$$

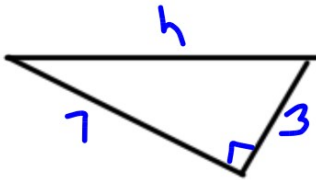
$$\sqrt{45} = \sqrt{a^2}$$

$$6.7 = a$$

Homework solutions

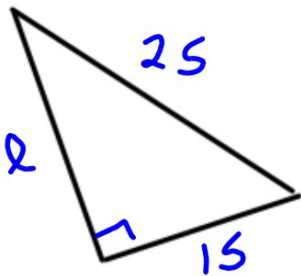
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7a)



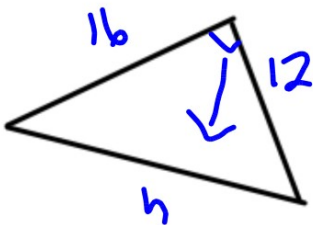
$$\begin{aligned}
 c^2 &= a^2 + b^2 \\
 c^2 &= 7^2 + 3^2 \\
 c^2 &= 49 + 9 \\
 c^2 &= 58 \\
 \sqrt{c^2} &= \sqrt{58} \\
 c &= 7.6
 \end{aligned}$$

b)



$$\begin{aligned}
 c^2 &= a^2 + b^2 \\
 25^2 &= a^2 + 15^2 \\
 625 &= a^2 + 225 \\
 625 - 225 &= a^2 + 225 - 225 \\
 400 &= a^2 \\
 \sqrt{400} &= \sqrt{a^2} \\
 20 &= a
 \end{aligned}$$

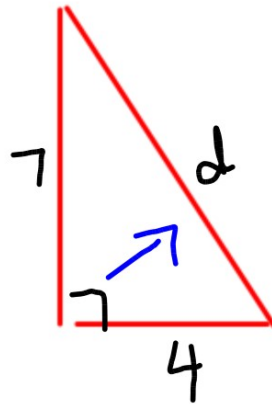
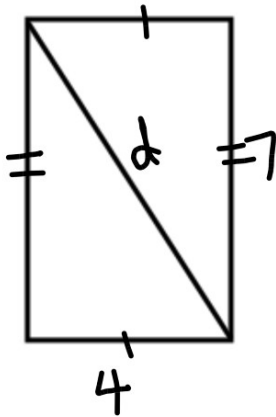
c)



$$\begin{aligned}
 c^2 &= a^2 + b^2 \\
 c^2 &= 12^2 + 16^2 \\
 c^2 &= 144 + 256 \\
 c^2 &= 400 \\
 \sqrt{c^2} &= \sqrt{400} \\
 c &= 20
 \end{aligned}$$

Homework solutions

a)



$$c^2 = a^2 + b^2$$

$$c^2 = 7^2 + 4^2$$

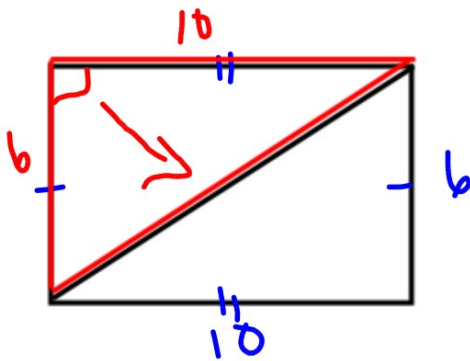
$$c^2 = 49 + 16$$

$$c^2 = 65$$

$$\sqrt{c^2} = \sqrt{65}$$

$$c = 8.1$$

b)



$$c^2 = a^2 + b^2$$

$$c^2 = 10^2 + 6^2$$

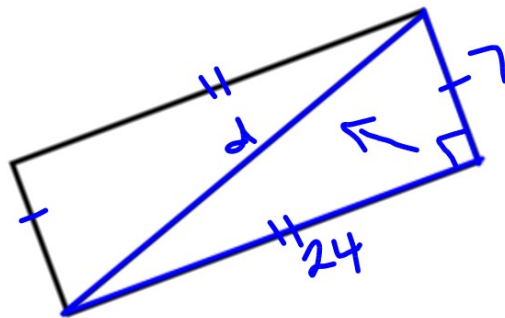
$$c^2 = 100 + 36$$

$$c^2 = 136$$

$$\sqrt{c^2} = \sqrt{136}$$

$$c = 11.7$$

★ c)



$$c^2 = a^2 + b^2$$

$$c^2 = 24^2 + 7^2$$

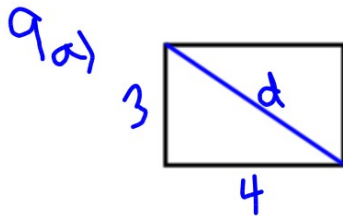
$$c^2 = 576 + 49$$

$$c^2 = 625$$

$$\sqrt{c^2} = \sqrt{625}$$

$$c = 25$$

## Homework solutions



$$c^2 = a^2 + b^2$$

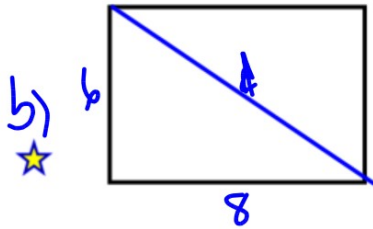
$$c^2 = 3^2 + 4^2$$

$$c^2 = 9 + 16$$

$$c^2 = 25$$

$$\sqrt{c^2} = \sqrt{25}$$

$$c = 5$$



$$c^2 = a^2 + b^2$$

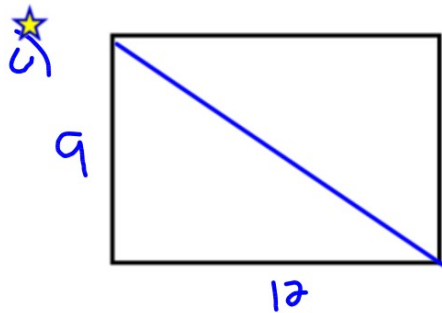
$$c^2 = 6^2 + 8^2$$

$$c^2 = 36 + 64$$

$$c^2 = 100$$

$$\sqrt{c^2} = \sqrt{100}$$

$$c = 10$$



$$c^2 = a^2 + b^2$$

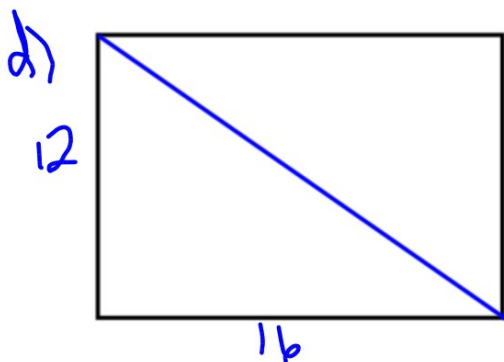
$$c^2 = 9^2 + 12^2$$

$$c^2 = 81 + 144$$

$$c^2 = 225$$

$$\sqrt{c^2} = \sqrt{225}$$

$$c = 15$$



I think the diagonal will be 20.

$$c^2 = a^2 + b^2$$

$$c^2 = 12^2 + 16^2$$


$$c^2 = 144 + 256$$

$$c^2 = 400$$

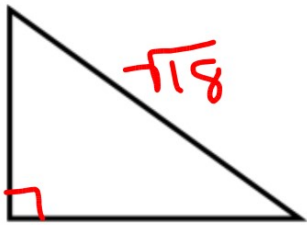
$$\sqrt{c^2} = \sqrt{400}$$

$$c = 20$$

## Homework solutions

10.  If you know the side lengths of a right triangle the hypotenuse will be the largest number since it is always the longest side.

12. 



$$c^2 = a^2 + b^2$$

$$(\sqrt{18})^2 = a^2 + b^2$$

$$18 = a^2 + b^2$$

$$9 + 9 = 18$$

$$9 = a^2 \quad 9 = b^2$$

$$3 = a \quad 3 = b$$

$$6 + 12 = 18$$

$$a^2 = 6 \quad b^2 = 12$$

$$a = \sqrt{6} \quad b = \sqrt{12}$$

$$10 + 8 = 18$$

$$a^2 = 10 \quad b^2 = 8$$

$$\sqrt{a^2} = \sqrt{10} \quad \sqrt{b^2} = \sqrt{8}$$

$$a = \sqrt{10} \quad b = \sqrt{8}$$

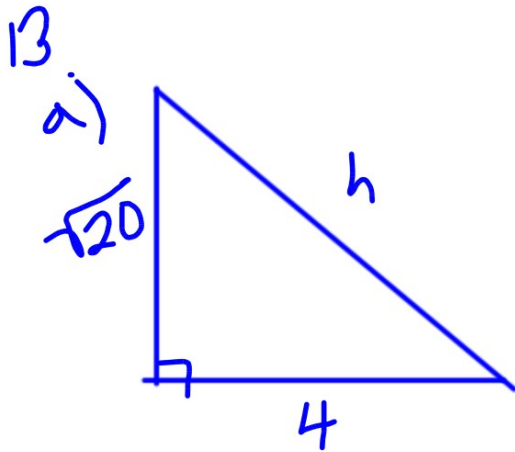
$$1 + 17 = 18$$

$$a^2 = 1 \quad b^2 = 17$$

$$a = \sqrt{1} \quad b = \sqrt{17}$$

$$= 1$$

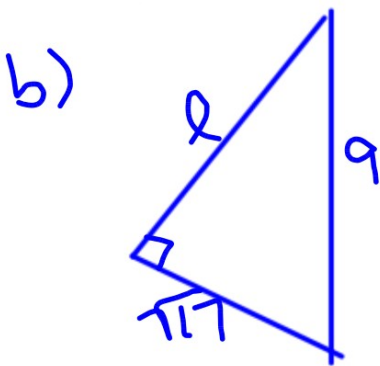
## Homework solutions



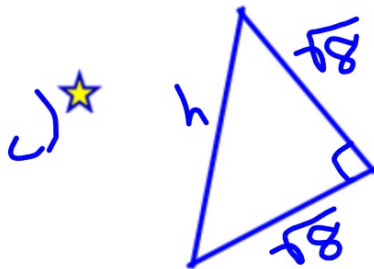
$$\frac{\sqrt{20} \times \sqrt{20}}{\sqrt{20 \times 20}}$$

20

$$\begin{aligned} c^2 &= a^2 + b^2 \\ c^2 &= (\sqrt{20})^2 + 4^2 \\ c^2 &= 20 + 16 \\ c^2 &= 36 \\ \sqrt{c^2} &= \sqrt{36} \\ c &= 6 \end{aligned}$$



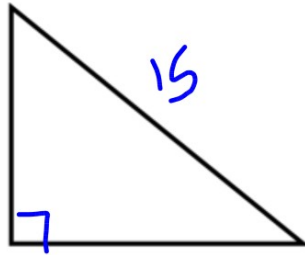
$$\begin{aligned} c^2 &= a^2 + b^2 \\ 12^2 &= a^2 + (\sqrt{17})^2 \\ 144 &= a^2 + 17 \\ 144 - 17 &= a^2 + 17 - 17 \\ 127 &= a^2 \\ \sqrt{127} &= \sqrt{a^2} \\ \sqrt{127} &= a \end{aligned}$$



$$\begin{aligned} c^2 &= a^2 + b^2 \\ c^2 &= (\sqrt{8})^2 + (\sqrt{8})^2 \\ c^2 &= 8 + 8 \\ c^2 &= 16 \\ \sqrt{c^2} &= \sqrt{16} \\ c &= 4 \end{aligned}$$

Homework solutions

15. hypotenuse = 15



$$c^2 = a^2 + b^2$$

$$15^2 = a^2 + b^2$$

$$225 = a^2 + b^2$$

a and b are whole numbers, so what perfect squares add to give 225?

$$81 + 144 = 225$$

$$a^2 = 81$$

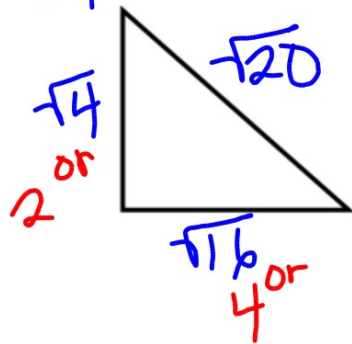
$$a = 9$$

$$b^2 = 144$$

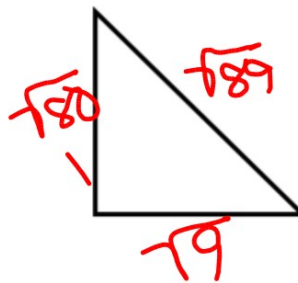
$$b = 12$$

Perfect Squares	
1	4
9	16
25	36
49	64
81	100
121	144
169	196
225	

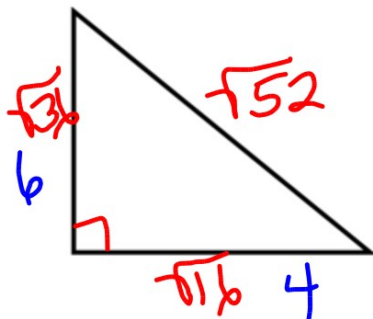
17 a)  $h = \sqrt{20}$



b)  $\sqrt{89}$



c)  $\sqrt{52}$



**If you are given the lengths of a triangle, how can you determine if it is a right triangle?**

Check

$$c^2 = a^2 + b^2$$

You can use Pythagorean Theorem to find out if the square of the longest side equals the sum of the squares of the other 2 sides.

Example 1) Side lengths 10 cm, 14 cm, 17 cm

bigger #  
should be c

In our example does  $c^2 = a^2 + b^2$  ?

If it does, it is a right angle triangle, otherwise it is not.

$c^2$	}	$a^2 + b^2$
17 <sup>2</sup>		10 <sup>2</sup> + 14 <sup>2</sup>
289cm <sup>2</sup>		100cm <sup>2</sup> + 196cm <sup>2</sup>
		296cm <sup>2</sup>

Not Same  
Not Right  $\triangle$

## Example 2)

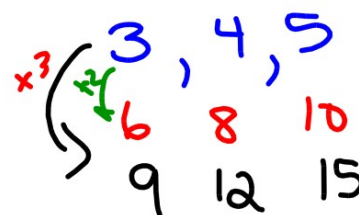
Is the triangle with sides 6, 8, and 10 a right angle triangle?  
(Show work)

$$\begin{array}{r} c^2 \\ 10^2 \\ 100 \end{array} \quad \left\{ \begin{array}{l} a^2 + b^2 \\ \underbrace{6^2}_{36} + \underbrace{8^2}_{64} \\ 36 + 64 \\ 100 \end{array} \right.$$

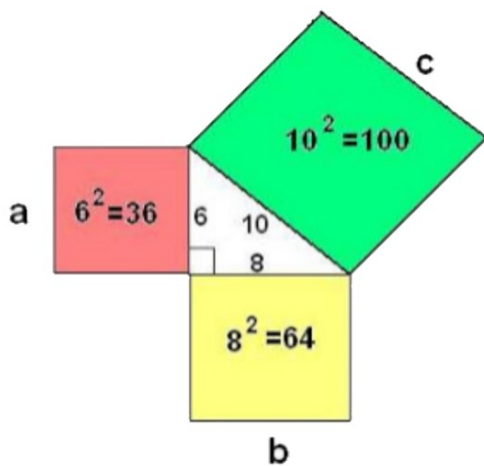
Same  
So Right  $\triangle$

Pythagorean Triple: *no decimals*  
 is a set of 3 whole numbers that satisfies  $c^2 = a^2 + b^2$

Example 1) 3,4,5  
 since  $5^2 = 3^2 + 4^2$



Example 2) 7, 24, 25  
 since  $25^2 = 7^2 + 24^2$



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Class/Homework

Test →

#4(a,b)

#6 (a,c,f)

#7(a,f)

#8



$$c^2 \quad \left. \vphantom{c^2} \right\} a^2 + b^2$$