# Bloom's Taxonomy and PRS

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# Bloom's Taxonomy


Developed 1956 by a group of educational psychologists headed by Benjamin Bloom (University of Chicago)

http://www.officeport.com/edu/blooms.htm

# Knowledge / Recall

What does the Pythagorean Theorem state?

1. The sum of the square roots of any two sides of an isosceles triangle, is equal to the square root of the remaining side.
2. The square of the hypotenuse of a right angle triangle is equal to the sum of the squares on the other two sides.
3. The sum of the squares of any two sides of an isosceles triangle, is equal to the square of the remaining side.

# Knowledge / Recall

Benefits of PRS questions at this level:

- May help raise attendance

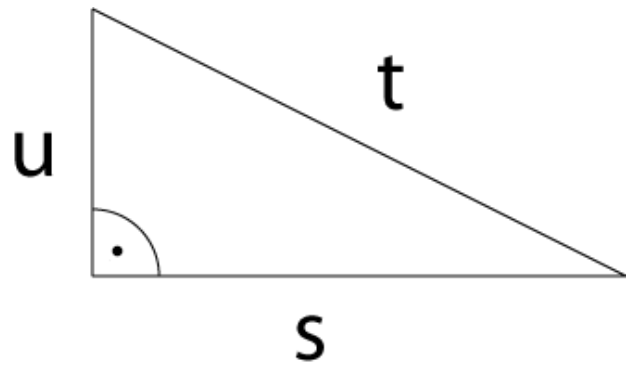
Drawbacks:

- Encourages learning material that will likely be forgotten soon
- Draws focus from underlying concepts

# Comprehension

How does the Pythagorean Theorem apply to the following triangle:

1. $s = t - u$
2. $s^2 = t^2 + u^2$
3. $s^2 = t^2 - u^2$



# Comprehension

Benefits:

- Ensures at least a minimal level of understanding
- May help raise attendance
- May encourage reading of textbook

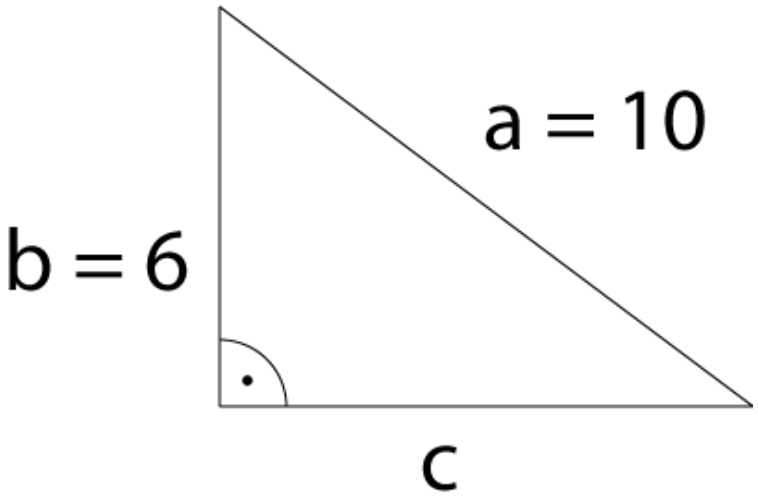
Drawbacks:

- Unclear if students can use material in practice

# Application

In the following triangle, what is c?

1. c = 7
2. c = 8
3. c = 9



# Application

Benefits:

- Tests if students can use what they have learned (at least in clear-cut situations)
- Provides interactive opportunity of trying out new skills

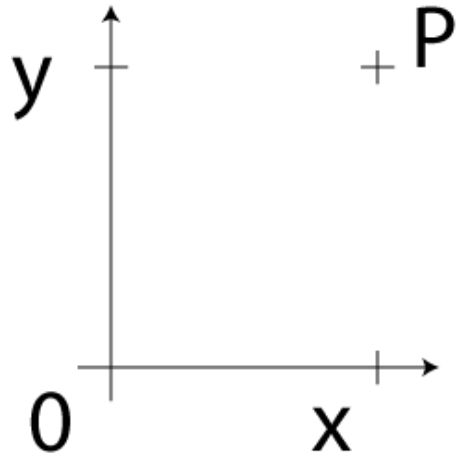
Drawbacks:

- Most practical situations are not so clear-cut and easy to recognize

# Analysis

What is the distance of P with coordinates x and y from the origin of the coordinate system?

1. $\text{sqrt}(x^2+y^2)$
2. $\text{sqrt}((x-y)^2+(x+y)^2)$
3. $\text{sqrt}((x/2)^2+(y/2)^2)$



# Analysis

Benefits

- Students learn to recognize course material in an unfamiliar context
- Encourages students to think for themselves

Drawbacks

- Need for suggested answers poses limits

# Synthesis

Suggest a way to use the Pythagorean Theorem for drawing a circle on a computer (i.e. find all points of a given distance r from central point)

1. Iterate over x and y values and only draw a point when $x^2+y^2 = r^2$
2. Iterate over x values and calculate y as $\text{sqrt}(r^2-x^2)$
3. Iterate over r and draw a point when $r^2 = x^2+y^2$

# Synthesis

Benefit

- Question highly meaningful to real-world problems

Drawback

- Multiple-choice question style of PRS does not allow students to independently solve problem

# Evaluation

Which algorithm would you recommend for drawing a circle on a computer?

1. Iterate over x and y values and only draw a point when $x^2+y^2 = r^2$
2. Iterate over x values and calculate y as $sqrt(r^2-x^2)$
3. Neither, I can think of a better algorithm

# Evaluation

Benefit

- Answering question requires in-depth understanding of problem
- PRS question can be used to start discussion

Drawback

- It is unclear whether the students decide on the basis of valid arguments
- Without further discussion, "I can think of a better way" answers cannot be evaluated

# Conclusion

- Don't get trapped in lowest levels of Bloom's Taxonomy
- PRS works very well in the intermediate regime of Bloom's Taxonomy
- For evaluation questions, PRS can trigger discussions
- Don't forget to ask problem-solving questions the conventional way