Categorizing Mathematical Tasks

(Indicate whether each task is low or high level by placing an X in the appropriate column.)

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<thead>
<tr>
<th>TASK</th>
<th>LOW LEVEL</th>
<th>HIGH LEVEL</th>
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**TASK A**

Manipulatives or Tools Available: Calculator

Treena won a 7-day scholarship worth $1,000 to the Pro Shot Basketball Camp. Round-trip travel expenses to the camp are $335 by air or $125 by train. At the camp she must choose between a week of individual instruction at $60 a day or a week of group instruction at $40 a day. Treena’s food and other expenses are fixed at $45 a day. If she does not plan to spend any money other than the scholarship, what are all choices of travel and instruction plans she could afford to make? Explain which option you think Treena should select and why.

Source: Kenney and Silver 1997, p. 108.

**TASK B**

Manipulatives or Tools Available: Counters

This question requires you to show your work and explain your reasoning. You may use drawings, words, and numbers in your explanation. Your answer should be clear enough for another person to read it and understand your thinking. It is important that you show all your work.

A pattern of dots is shown below. At each step, more dots are added to the pattern. The number of dots added at each step is more than the number added in the previous step. The pattern continues infinitely.

<table>
<thead>
<tr>
<th>(1st step)</th>
<th>(2nd step)</th>
<th>(3rd step)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 dots</td>
<td>6 dots</td>
<td>12 dots</td>
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Marcy has to determine the number of dots in the 20th step, but she does not want to draw all 20 pictures and then count the dots.

Explain how she could do this and give the answer that Marcy should get for the number of dots.

Source: Kenney and Silver 1997, p. 240.
**TASK C**

**Manipulatives or Tools Available:** Square pattern tiles

Using the side of a square pattern tile as a measure, find the perimeter (i.e., distance around) of each train in the pattern block figure shown below.

![Pattern block figure showing trains](image)

**TASK D**

**Manipulatives or Tools Available:** None

Part A: The place kicker on the North High School football team has made 13 out of 20 field goals so far this season. The place kicker on the South High football team has made 15 out of 25 field goals so far this season. Which player has made the greatest percentage of field goals?

Part B: If the “better” player does not play for the rest of the season, how many field goals would the other player have to make in the next 10 attempts to have the greatest percentage of field goals?
**TASK E**

**Manipulatives or Tools Available: Calculator**

Divide using paper and pencil. Check your answer with a calculator and round the decimal to the nearest thousandth.

\[
\begin{array}{cc}
525 \\
1.3 \\
52.75 \\
7.25 \\
30.459 \\
.12 \\
\end{array}
\]

**TASK F**

**Manipulatives or Tools Available: None**

Match the property name with the appropriate equation.

1. Commutative property of addition
2. Commutative property of multiplication
3. Associative property of addition
4. Associative property of multiplication
5. Identity property of addition
6. Identity property of multiplication
7. Inverse property of addition
8. Inverse property of multiplication
9. Distributive property
10. Property of zero for multiplication

a. \(r(s + t) = rs + rt\)

b. \(x \cdot 1/x = 1\)

c. \(-y + x = x + (-y)\)

d. \(a/b + -a/b = 0\)

e. \(y \cdot (xz) = (yz) \cdot x\)

f. \(1 \cdot (xy) = xy\)

g. \(d \cdot 0 = 0 \text{ and } 0 \cdot d = 0\)

h. \(x + (b + c) = (x + b) + c\)

i. \(y + 0 = y\)

j. \(p \cdot q = q \cdot p\)
**TASK G**

Manipulatives or Tools Available: Base-ten blocks, grid paper

.08 .8 .08 .008000

Make three observations about the relative size of the four numbers above. Be sure to explain your observations as clearly as possible. Feel free to illustrate your observations if you think it would help others understand them.

Adapted from QUASAR Project—*QUASAR Cognitive Assessment Instrument*—Released Task.

**TASK H**

Manipulatives or Tools Available: Grid Paper

The pairs of numbers in (a) through (d) below represent the heights of stacks of cubes to be leveled off. On grid paper, sketch the front views of columns of cubes with these heights before and after they are leveled off. Write a statement under the sketches that explains how your method of leveling off is related to finding the average of the two numbers.

a) 14 and 8  
b) 16 and 7  
c) 7 and 12  
d) 13 and 15

*By taking 2 blocks off the first stack and giving them to the second stack, I've made the two stacks the same. So the total number of cubes is now distributed into 2 columns of equal height. And that is what average means.*

Taken from *Visual Mathematics, Course 1*, The Math Learning Center, 1995, Lesson 10, Follow-up Student Activity 10.1, #1, p. 121.

**TASK I**

Manipulatives or Tools Available: None

Write and solve a proportion for each of the following.

17 is what percent of 68?  
What is 15% of 60?  
8 is 10% of what number?  
24 is 25% of what number?  
28 is what percent of 140?  
What is 60% of 45?  
36 is what percent of 90?  
What is 80% of 120?  
21 is 30% of what number?
**TASK J**

Manipulatives or Tools Available: None

One method of mentally computing $7 \times 34$ is illustrated in the diagram below.

```
7
7 X 4 = 28
7 X 30 = 210
```

Mentally compute these products. Then sketch a diagram that describes your methods for each.

a) $27 \times 3$

b) $325 \times 4$


**TASK K**

Manipulatives or Tools Available: Calculator with scientific functions

Penny's mother told her that several of her great-great-great-grandparents fought in the Civil War. Penny thought this was interesting, and she wondered how many great-great-great-grandparents that she actually had. When she found that number, she wondered how many generations back she'd have to go until she could count more than 100 ancestral grandparents or 1000, or 10,000, or even 100,000. When she found out, she was amazed and pretty glad she had a calculator. How do you think Penny might have figured out all this information? Explain and justify your method as clearly and completely as possible.


**TASK L**

Manipulatives or Tools Available: Base-ten blocks

Using base-ten blocks, show that 0.292 is less than 0.3.
**TASK M**

**Manipulatives or Tools Available: None**

Use the following information and the graph to write a story about Tony’s walk:

At noon, Tony started walking to his grandmother’s house. He arrived at her house at 3:00. The graph below shows Tony’s speed in miles per hour throughout his walk.

![Graph showing Tony's speed from noon to 3:00]  

Write a story about Tony’s walk. In your story, describe what Tony might have been doing at the different times.

Taken from the QUASAR Project—QUASAR Cognitive Assessment Instrument—Released task.

**TASK N**

**Manipulatives or Tools Available: None**

The cost of a sweater at J. C. Penney’s was $45.00. At the “Day and Night Sale” it was marked 30% off the original price. What was the price of the sweater during the sale? Explain the process you used to find the sale price.

**TASK O**

**Manipulatives or Tools Available: None**

Give the fraction and percent for each decimal.

0.20 = ____ = ____

0.25 = ____ = ____

0.33 = ____ = ____

0.50 = ____ = ____

0.66 = ____ = ____

0.75 = ____ = ____
**Task P**

Manipulatives or Tools Available: Pattern blocks

Find $\frac{1}{2}$ of $\frac{1}{3}$. Use pattern blocks. Draw your answer.

1/2 of 1/3 or $\frac{1}{2} \times \frac{1}{3} =$

Find $\frac{1}{3}$ of $\frac{1}{4}$. Use pattern blocks. Draw your answer.

1/3 of 1/4 or $\frac{1}{3} \times \frac{1}{4} =$

Find $\frac{1}{4}$ of $\frac{1}{3}$. Use pattern blocks. Draw your answer.

1/4 of 1/3 or $\frac{1}{4} \times \frac{1}{3} =$