















Problem Solving

Up Your

Learning

K E Y	<u>NOTES</u> PROBLEMS is eight steps for problem solving. It is a strategy that assists you to work out problems in an organized, systematic way and allows you to learn while doing it. It can be used for problems in math, science and out of school problems (you actually solve hundreds of problems each day); <i>For example: What clothes to wear?, What is the quickest way to . . . , Which is a better value . . . or</i>	<u>PIC</u> P R O B L E M S	<u>TERM QUESTION</u> What is PROBLEMS?
	Problem solving depends on the following: 1. Content – what you already know about the problem and the situation.. 2. Problem solving ability - how you go about solving it (PROBLEMS fits in here).	1. C 2. P	Problem solving depends on?
	<i>Learning the content can be done by reading, previewing, listening, making usable notes, using summary sheets, making up practice tests, using index cards, reviewing assignments, homework, daily review, etc.</i>		How do I learn the content?
	Problem solving ability is developed by using the PROBLEMS strategy on all problems (even on the “easy to solve” problems) until the strategy becomes a habit, then continue using it in and out of school.		
P R O B L E M S	<p>Problem, what are you trying to solve? Put the problem into your own words. You need to know what you are solving for before you can solve it.</p> <p>Record what is known about the problem Summarize in your own words and symbols the known information.</p> <p>Observe a diagram, table or illustration of the situation. Draw or sketch a visual to help you recall other information.</p> <p>Brainstorm all you know about this problem Problem type, methods of solving, impact on others and information sources. What concepts, ideas and operations learned from experience may apply here.</p> <p>List estimated or possible solutions. In math and science, give a numerical estimate with units and in other situations write out possible solutions.</p> <p>Engage in solving the problem. Use one or more of the POSITIVE methods considered on page 2.</p> <p>Make a check to find if the solution solves the problem Check back to the problem and your estimate, then write a sentence using the words from original problem.</p> <p>Smile, what are variations to this problem? Think about other problems similar to this problem. You will be able to come up with many that should be recorded and thought about. Also, how this problem could be done differently to get either the same or a different answer.</p>	<p>?</p> <p></p> <p></p> <p></p> <p></p> <p>+</p> <p></p> <p></p>	<p>P represents?</p> <p>R represents?</p> <p>O represents?</p> <p>B represents?</p> <p>L represents?</p> <p>E represents?</p> <p>M represents?</p> <p>S represents?</p>

Example: PROBLEMS

<p>How many donkeys and chickens are there in a field if there are 10 heads and 34 legs?</p>		<p>Problem</p>
<p>Problem is to find the number of each type of animal in the field.</p>		<p>Record</p>
<p>Record that there are ten animals in the field (since each animal has one head) and the total number of legs needs to be 34.</p>		<p>Record</p>
<p>Observe a illustration: There are donkeys (4 legs & 1 head) There are chickens (2 legs and 1 head).</p>		<p>Observe</p>
<p>Brainstorm: Donkeys have four legs and one head, Chickens have two legs and one head Seems like two things that each have a number of parts (legs). Need to add number of legs on all chickens to number of legs on all donkeys.</p>		<p>Brainstorm</p>
<p>List possible solutions: Probably any number of each but needs to be a total of ten animals. Maybe 5 chickens and 5 donkeys = 10 animals but is $5 \times 2 + 5 \times 4 = 30$ legs which is not enough legs, so we must need more donkeys and less chickens. Solution needs to be between 0 and 10 donkeys and the number of chickens to add to 10.</p>		<p>List estimate</p>
<p>Engage in solving the problem, using one or more POSITIVE methods.</p>		<p>Engage in</p>
<p>P Patterns identified and extended Donkeys 0 Chickens 10 equals 20 legs Donkeys 1 Chickens 9 equals 22 legs Donkeys 2 Chickens 8 equals 24 legs Seems as donkeys increase, 2 legs are added, extend pattern until 34 legs & 10 heads.</p> <p>O Observe a picture you've drawn and fill in all you can. Could continue above picture.</p> <p>S Simplify the problem to a easier one and work up to the original problem. For example, figure it out for 14 legs – 4 heads (3 donkeys & 1 chicken) and then work up to 34 legs.</p> <p>I Imitate another problem done before. Find a similar question in your notes or text.</p> <p>T Trial and error- Try 6 donkeys and 4 chickens = 32 legs, no good, try again until correct.</p> <p>I Invert the question by working back from the answer to develop a plan to work it out. Start out with the 34 legs and work backwards to see number of each animal needed.</p> <p>Verbalize the question -talk to someone or to yourself (explain it to a mirror).</p> <p>V Equation or formula substitution Number of legs is 4 times number of donkeys plus 2 times number of chickens and number of heads is 10. If doing equation: Let number of donkeys = d then number of chickens would equal to $10 - d$ for total of 10. Therefore $4(d) + 2(10-d) = 34 \rightarrow 4d + 20 - 2d = 34 \rightarrow 2d + 20 = 34 \rightarrow 2d = 34 - 20$ $2d = 14 \rightarrow d = 7$ so number of donkeys = 7 and chickens = 3 CHECK $4(7) + 2(3) = 34, 7 + 3 = 10$</p>		<p>solving using POSITIVE method</p>
<p>Make a check: Yes, 7 donkeys and 3 chickens adds to 10 animals and the number of legs = 34. So the sentence would be: <i>There would be 7 donkeys and 3 chickens in the field for 34 legs and 10 heads.</i></p>		<p>Make check to the words & sentence it</p>
<p>Smile, what are variations: -Number of legs needed could be 24 and heads 10 (8c & 4d). -Could change problem to need 34 things in 10 cartons of 2 and 4. -Could use money, ten coins (nickels and dimes) add to 80 cents, number of each?</p>		<p>Smile, what are variations?</p>
<p><u>Every time</u> you have a problem, use PROBLEMS. Follow PROBLEMS and do <u>all</u> the steps. If you haven't solved it in 5 minutes, leave it, try again later using a different method, . . . if still not working, try a another method. You will get better and better at problem solving and be able to use the PROBLEMS strategy whenever you need to solve a problem and are well on your way to becoming a great problem solver.</p>		<p>Learning PROBLEMS</p>