Questions on 7.4 HW? Double check what you found for #2 below...

2. What is the wait time for a guest that arrives at the end of the line for the *Turbulent Waters Dive* at each of the times listed in the following table?

t	*Time of Day*	P(t)	*Wait Time* (minutes)
-2	10:00 a.m.	1620	4.8
0	12:00 noon	2476	39.04
2	2:00 p.m.	2940	57.6
4	4:00 p.m.	2940	57.6
8	8:00 p.m.	1620	4.8

a. For each instant in time you had to complete a series of calculations. Describe how you found the wait time at different times of the day.

use t to find p(t); plug p(t) into w(p) to find wait time.

b. Can you create a single rule that will determine the wait time as a function of the time of day?

yes; $w(p(t)) = 60\left(\frac{p(t)-1500}{1500}\right)$

$=60\left(\frac{[3000\cos(\frac{1}{5}(t-3))]-1500}{1500}\right)$

To maintain crowd control when the lines get long, cast members dressed as pirates (the *Turbulent Waters Dive* has a pirate theme) mingle with the waiting guests. Their antics distract the guests who listen attentively to their pirate jokes. The number of cast members needed depends on the number of people waiting in the line.

- **Number of ushers needed as a function of the number of people in line:** $c(p) = \frac{p}{150}$

  → ***p*** represents the number of people in line

  → ***c*** represents the number of cast members needed

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3. How many cast members are needed to entertain and distract the waiting guests at each of the following times of the day?

t	Time of Day	p(t)	Cast Members Needed
-2	10:00 a.m.	1620	10.8 → 11
0	12:00 noon	2476	16.5 → 17
2	2:00 p.m.	2940	19.6 → 20
4	4:00 p.m.	2940	19.6 → 20
8	8:00 p.m.	1620	10.8 → 11
	t hours before or after noon ($t < 0$ before noon, $t > 0$ after noon)		

On warm, sunny days misters are used to cool down the waiting guests. The number of misters that need to be turned on depends on the size of the waiting area that has been opened up to contain the number of people in line.

- **Number of misters needed as a function of the waiting area:** $m(a) = \frac{a}{1000}$

  → ***a***, the waiting area, is measured in square feet

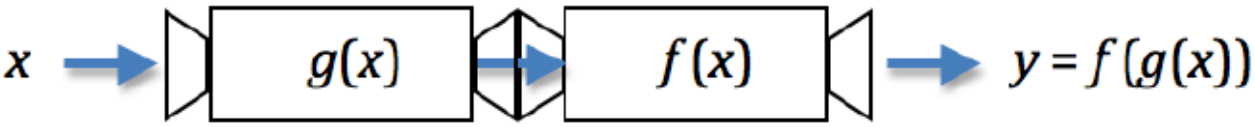
  → ***m*** represents the number of misters to be turned on

4. How many misters need to be turned on to cool the waiting guests at each of the following times of day?

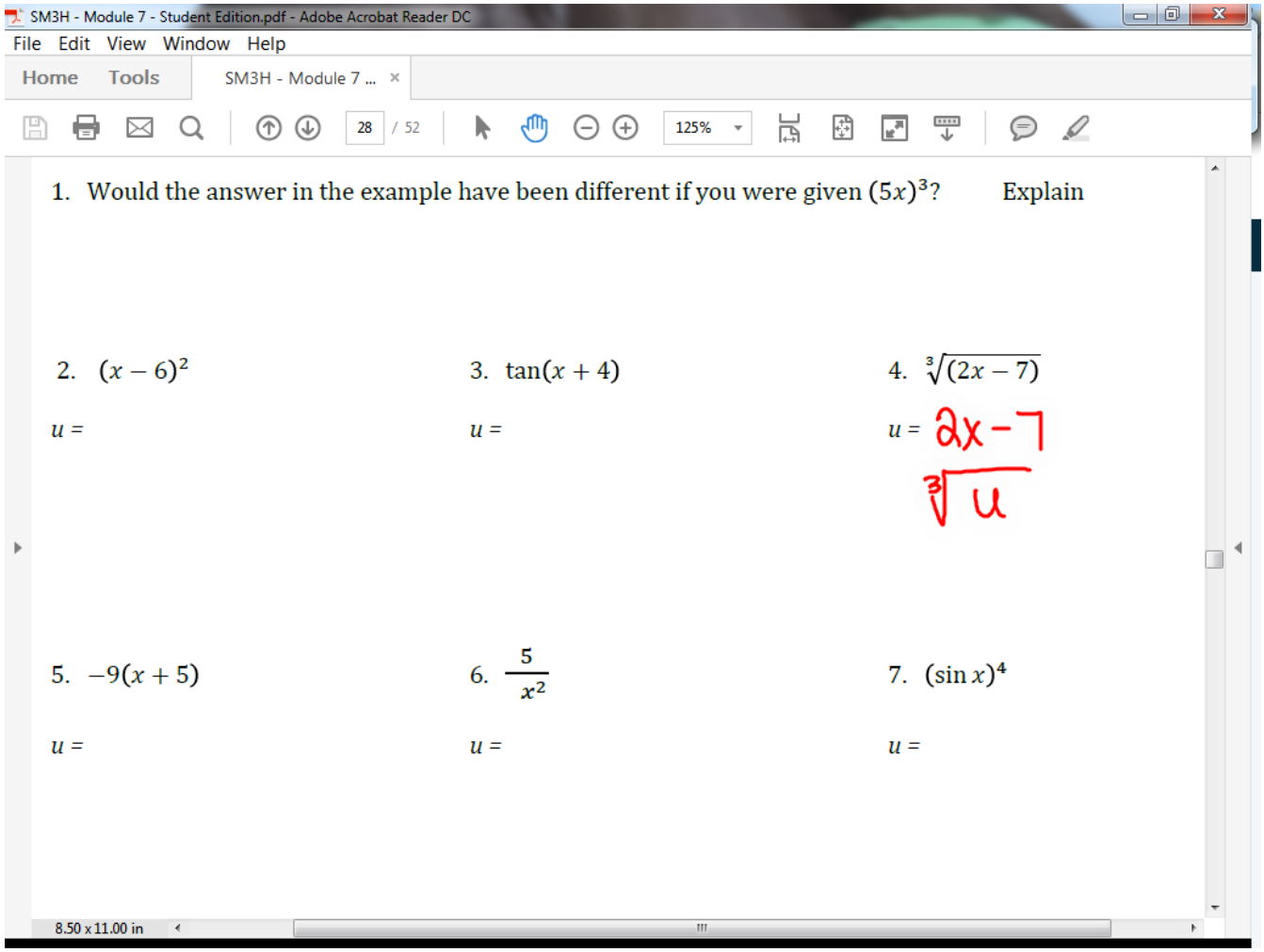
Time of Day	a(p)	Misters Needed
10:00 a.m.	6580	6.58 → 7
12:00 noon	10004	10.004 → 11
2:00 p.m.	11860	11.860 → 12
4:00 p.m.	11860	11.860 → 12
8:00 p.m.	6580	6.58 → 7
t hours before or after noon ($t < 0$ before noon, $t > 0$ after noon)		

$m(a(p(t)))$

5. Explain how the following diagram might help you think about the work you have been doing on the previous problems. How does the notation used in the diagram support the way you have been combining functions in this task? This way of combining functions is called ***function composition***.



SKIP #6-10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1. Would the answer in the example have been different if you were given $(5x)^3$? Explain

2. $(x-6)^2$

$u =$

3. $\tan(x+4)$

$u =$

4. $\sqrt[3]{(2x-7)}$

$u = 2x-7$

$\sqrt[3]{u}$

5. $-9(x+5)$

$u =$

6. $\frac{5}{x^2}$

$u =$

7. $(\sin x)^4$

$u =$

8.50 x 11.00 in

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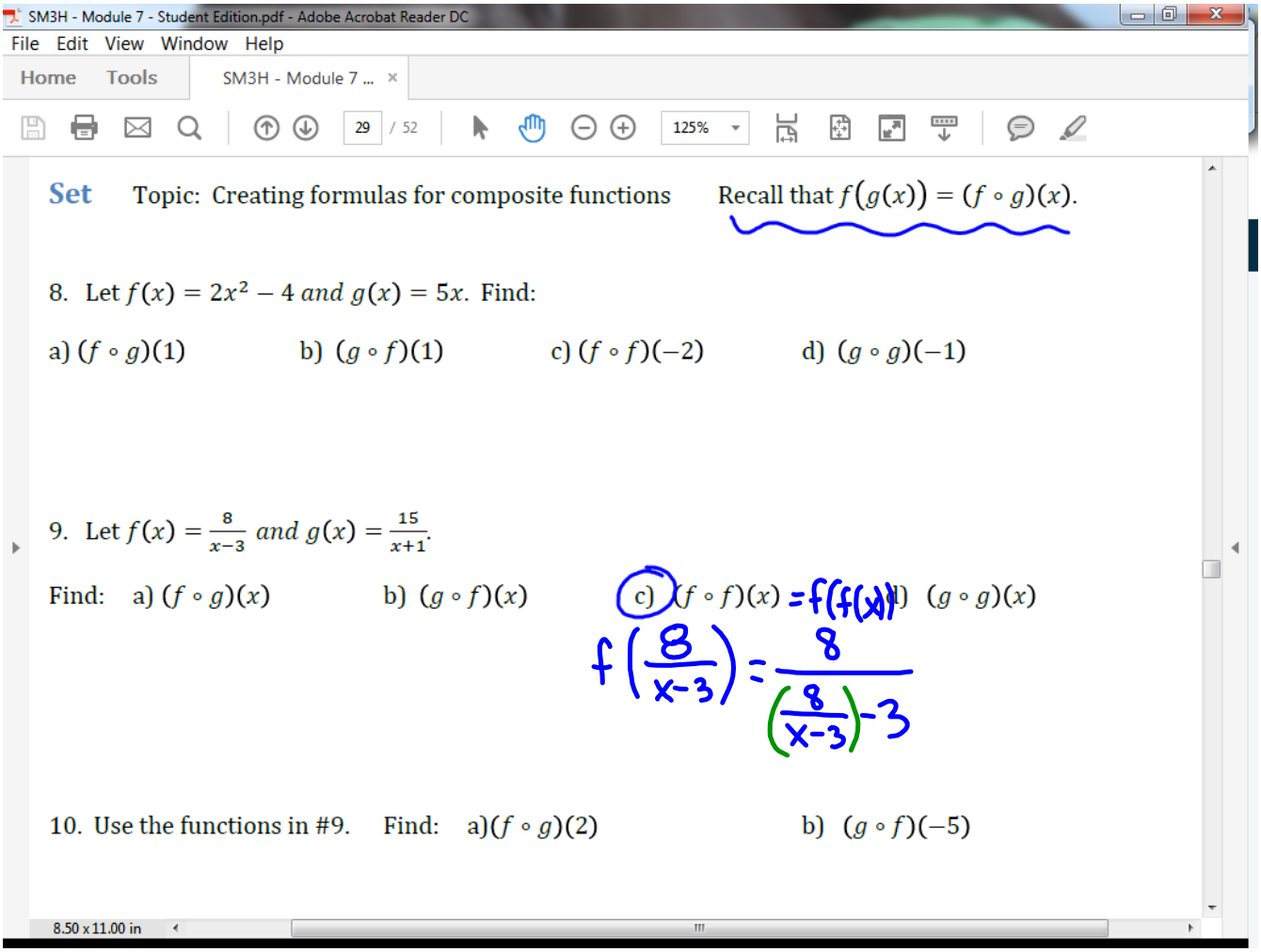
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Set Topic: Creating formulas for composite functions Recall that $f(g(x)) = (f \circ g)(x)$.

8. Let $f(x) = 2x^2 - 4$ *and* $g(x) = 5x$. Find:

a) $(f \circ g)(1)$ b) $(g \circ f)(1)$ c) $(f \circ f)(-2)$ d) $(g \circ g)(-1)$

9. Let $f(x) = \frac{8}{x-3}$ *and* $g(x) = \frac{15}{x+1}$.

Find: a) $(f \circ g)(x)$ b) $(g \circ f)(x)$ c) $(f \circ f)(x) = f(f(x))$ d) $(g \circ g)(x)$

$$f\left(\frac{8}{x-3}\right) = \frac{8}{\left(\frac{8}{x-3}\right)-3}$$

10. Use the functions in #9. Find: a)$(f \circ g)(2)$ b) $(g \circ f)(-5)$

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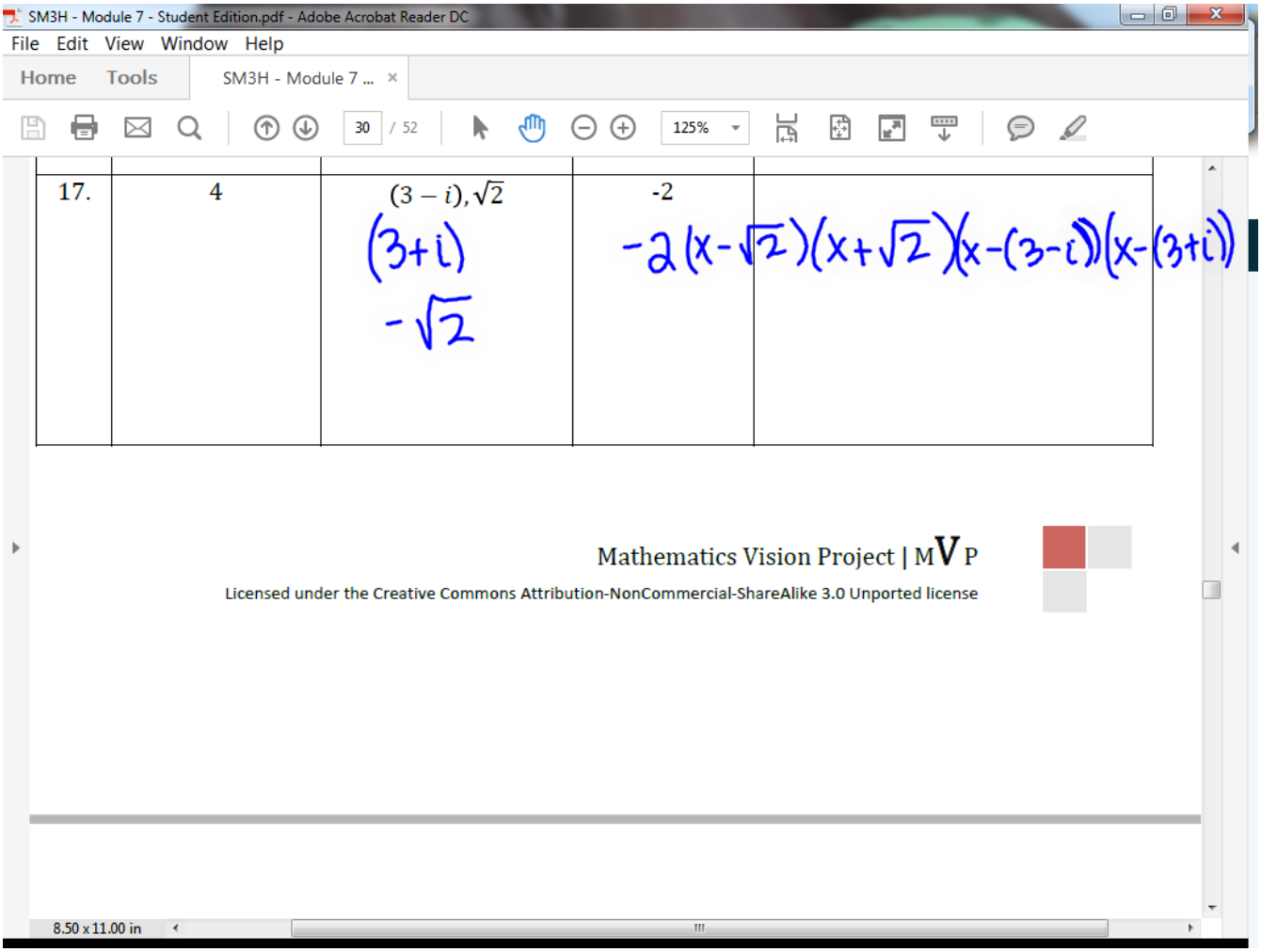

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7.5 Translating My Composition

A Solidify Understanding Task

All this work with modeling rides and waiting lines at the local amusement park may have you wondering about the variety of ways of combining functions. In this task we continue building new functions from old, familiar ones.

Suppose you have the following "starter set" of functions.

$f(x) = x + 5$

$g(x) = x^2$

$h(x) = 3x$

$j(x) = 2^x$

$k(x) = x - 1$

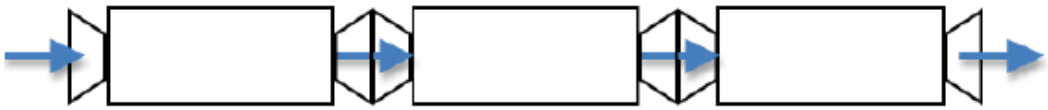
Do the following steps with this set of functions:

1st. Build a composite function using any three of the above function rules in any order

2nd. Write your final function rule as a single algebraic expression in terms of x

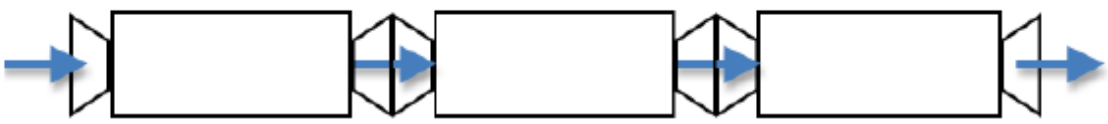
3rd. Give your function rule to your partner, you should also receive a function rule from your partner

4th. Your partner should fill in the following diagram, decomposing your rule into its component parts and combining them in the correct order



1. First, let's try this example:

Your partner gives you $f_1(x) = 3(x+5)^2$. Complete this diagram to decompose this composition into its component parts.



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2. To test your decomposition you can try running a number or two through your chain of function machines, and see if you get the same results as when you evaluate the function rule for the same numbers. What do you notice when you do this?

3. Now it's your turn! Create your own function rule using the set of functions given at the beginning of this task and following the four steps given above. Your partner should do the same and give you his or her function rule.

Record the function rule you received here:

Complete this diagram to decompose your partner's composition into its component parts.

Test your decomposition for a few values. Make any adjustments necessary based on your test results.

4. Instead of giving you the function rule, suppose your partner gives you the following input-output table. Can you create the composition function rule based on this information? Describe how you used the numbers in this table to create your rule.

x	$f(x)$
0	5 ½
1	6
2	7
3	9
4	13
5	21

5. Is function composition commutative? Give reasons to support your answer.

Homework

Finish 7.5H "Ready, Set, Go"

Mar 28-11:26 AM