

Quiz 4

Key

Show *all* your work. No credit is given without reasonable supporting work. There are *two* sides to this quiz.

1. [3] (§1.2 #69) Simplify the expression below and assume that all letters denote positive numbers.

$$\frac{(9st)^{\frac{3}{2}}}{(27s^3t^{-4})^{\frac{2}{3}}} = \frac{3^3 s^{\frac{3}{2}} t^{\frac{3}{2}}}{3^3 s^2 t^{-\frac{8}{3}}} = 3 s^{-\frac{1}{2}} t^{\frac{25}{6}} = \frac{3t^{\frac{25}{6}}}{s^{\frac{1}{2}}}$$

$\frac{3}{2} - \frac{2}{3} = \frac{9}{6} - \frac{4}{6} = \frac{5}{6}$
 $\frac{3}{2} + \frac{8}{3} = \frac{9}{6} + \frac{16}{6} = \frac{25}{6}$

(1.5) started (1.5)
 conversion (1.5)
 algebra (1.5)

2. [2] (§1.2 #90) The distance from the earth to the sun is about 93 million miles. The speed of light is about 186,000 mi/s. How long will it take for a light ray from the sun to reach earth?

$$93,000,000 \text{ miles} \cdot \frac{1 \text{ sec}}{186,000 \text{ mi}} = \frac{93,000}{186} \text{ sec}$$

= 500 sec

or = 500 sec · $\frac{1 \text{ min}}{60 \text{ sec}}$ = 8.3 min

started (1.5)
 conversion (1.5)
 algebra (1.5)

(b) started (1.5)

% increase = % earned by min quiz + % earned by web assign + % earned by written test + % earned by Quiz + % earned by Exam + % earned by Final

$$+1.1 = .95 \cdot 5 + .10 \cdot 10 + 0.15 + .70 \cdot 15 + 1.00 \cdot 30 + x \cdot 25$$

where x is the % earned on the final (1.5)

$$= 46.25 + x \cdot 25$$

To earn a 2.5 in this class the graph shows James needs a 75% (1.5)

$$75 = 46.25 + 25x$$

$$-46.25 \quad -46.25$$

$$28.75 = 25x$$

$$x = \frac{28.75}{25}$$

$$x = 1.15$$

interpreted (1.5)

James would need 115% on the final to make a 2.5 in the class (so he can't earn a 2.5). Note if he earns 95% on the final, James could get a 2.5.

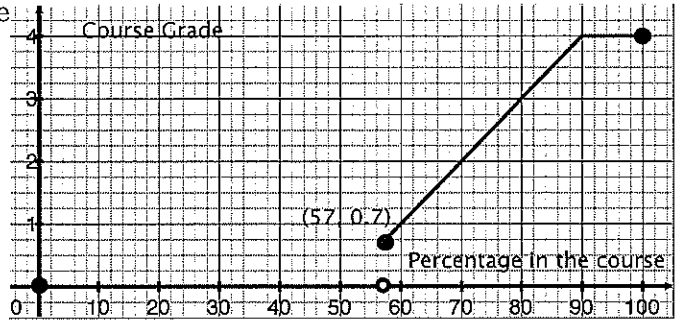
3. [5] (Word Problem Wks) Choose *ONE* of the following. Clearly identify which of the two you are answering and what work you want to be considered for credit.

(a) Potassium ferrate has been considered for use in batteries but costs \$100 per gram. You have a battery case that is currently *full* with 50 grams of a mixture that is 10% potassium ferrate. You would like to build the battery but you need a higher concentration of the potassium ferrate (40% should do it). What is the minimum amount of potassium ferrate you will have to buy and add to the battery case (after you dumped out some of the original mixture to make room) to get the cathode to work?

(b) James T. Kirk is in this course and would like to know if it is still possible to earn a 2.5 now that he's taken two exams. He has looked at the gradebook on WebAssign and has computed the averages listed below.

Assuming James' work does not drastically change in the remaining 3 weeks and his averages remain about the same, find what grade he needs to get on the final to receive a 2.5 in the course. In case you don't remember, the weights specified in the syllabus and the graph of the function f that takes your class percentage x and returns your score on a 4. scale are also provided.

	weight	James' ave
Mini-Quizzes	5%	95%
WebAssign	10%	10%
WrittenHW	15%	0%
Quizzes	15%	70%
2 Midterms	30%	100%
Final	25%	



started (1.5)

(a) let x be the amount of potassium ferrate we will add
 = the amount of mixture we will have to remove. } (1)

let y be the amount of original mixture we keep.

Note

	mixture		potassium ferrate
$x + y = 50$	}	(1.5)	$x + .10y = .40 \cdot 50$ (*)
$\Rightarrow y = 50 - x$	so substitute *	(1.5)	$x + .10(50 - x) = 20$ alg (1)
			$\Rightarrow x + 5 - .1x = 20$
			$\Rightarrow .9x = 15 \Rightarrow x = \frac{15}{.9} = 16.\bar{6}$

Check: $16.\bar{6} + .10(50 - 16.\bar{6}) = 20$ g of potassium ferrate ✓

So you need to buy $\$100 \cdot 16.\bar{6} \approx \$1,666$ worth of potassium ferrate

2 correct answers interpret (1.5)