



# OAT<sup>Q&As</sup>

Optometry Admission

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### QUESTION 1

Given this hypothetical compound,  $K_2X_2F_2$ . Find the atomic weight of the unknown element, X, if the molar mass of the compound itself totals 162 g/mol.

- A. 23 g/mol
- B. 30 g/mol
- C. 35 g/mol
- D. 46 g/mol
- E. 50 g/mol

Correct Answer: A

Looking at the periodic table, add up the molar mass of the elements that are known. 2K gives  $(39 + 39)$ , and 2F gives  $(19 + 19)$ :

$$39 + 39 + 19 + 19 = 116$$

Thus, 116 is 46 short of the total 162, thus there has to be 46 g of the unknown 'X'. Since there are 2 moles of this, the atomic weight of this element has to be 23 g/mol.

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### QUESTION 2

Express 8% as a fraction.

- A.  $4/25$
- B.  $4/100$
- C.  $2/50$
- D.  $2/25$

Correct Answer: D

$$8\% = 8/100 = 2/25.$$

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### QUESTION 3

Robert is taking a road trip from Jacksonville to Fort Lauderdale. He drives 150 miles at 70 miles per hour and then drives another 150 miles at 50 miles per hour. What is his average speed?

- A. 40 mph
- B. 58.4 mph
- C. 63 mph



D. 70 mph

E. Need more information.

Correct Answer: B

Speed is equivalent to distance over time:  $\text{Speed} = (\text{Distance} / \text{Time})$ .

The total distance of this trip is  $150 + 150 = 300$  miles

Break down the question into 2 components, one for each speed and distance traveled.

First 150 miles:

$\text{Time} = (\text{Distance} / \text{Speed}) = (150 / 70) = 2.14$  hours

Second 150 miles:

$\text{Time} = (\text{Distance} / \text{Speed}) = (150 / 50) = 3.0$  hours

Total time is therefore:  $2.14 + 3.0 = 5.14$  hours

Thus, returning back to the  $\text{Speed} = (\text{distance} / \text{time})$

$\text{Speed} = (\text{Distance} / \text{Time}) = (300 \text{ miles}) / (5.14 \text{ hours}) = 58.4$  miles per hour

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#### QUESTION 4

A segment of DNA contains the following code: ATGGCGCCTTA. What would the sequence of its transcribed mRNA be?

A. ATTCCGCGGTA

B. TACCGCGGAAT

C. UACCGCGGAU

D. AUCCGCGGAAT

E. ATGGCGCCTTA

Correct Answer: C

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#### QUESTION 5

A wire of resistance R is about to be replaced with a different wire that is three times as long and having a radius three times as much as the original wire. What is the resistance of this new wire?

A.  $1/2$

B.  $1/4$

C.  $1/3$

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D. 1/5

E. The resistance is the same in both wires.

Correct Answer: C

The resistance formula is  $R = \rho(L/A)$ ; where  $\rho$  = resistivity,  $L$  = length and  $r$  = radius.

Tripling the length gives  $3L$ , whereas tripling the radius would make the area 9x as big ( $A = \pi r^2$ ). Thus, you would end up with a ratio of  $3/9$ , which is  $1/3$  the resistance of the new wire.

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