

## **Solutions and Analysis to Michael Smith 2004 Exam**

In this section, you will find solutions to all the questions on this year's contest. In Section 7.0, you will find 10 histograms that show the distribution of questions answered correctly by the contestants divided by province.

### Question 1: Correct Answer: E

From the perspective of the roadside, when the perimeter of the car tires touch the pavement, their velocity is zero, and therefore the answer is E. Only 13 percent of students answered this one correctly, which was a bit surprising.

### Question 2: Correct Answer: D

### Question 3: Correct Answer: C

Using the formulae  $P_{\text{Transmitted}} = IV$  and  $P_{\text{Lost}} = I^2R$ , one can see that if  $I$  is low the power lost will be lower, therefore to transmit the same amount of power  $V$  must be high to minimise energy being lost as heat, and the answer is C. 47% of students answered this one correctly.

### Question 4: Correct Answer: D

Radio waves travel at 300,000 km/s. 30% of students knew this was the correct answer.

### Question 5: Correct Answer: A

At the spring equinox, the earth's rotating axis is perpendicular to that of the Sun. This means that if you were to stand at the geographic North Pole, you would see the Sun skim all the way around the horizon, so the answer is A. 36% of students were correct on this question.

### Question 6: Correct Answer: B

You can calculate this question if you know the mass of a hockey puck, but the question was intended to be roughly estimated, hence the large differences in mass of the 5 answers. Using ratios it can be determined that the nucleus of a hydrogen atom would be approximately as massive as B, the combined mass of the forward line of an NHL team. Only 14% of students got this question right.

### Question 7: Correct Answer: C

### Question 8: Correct Answer: B

The answer to this question can be determined by using the periodic table provided. 56% of the students were able to figure it out.

### Question 9: Correct Answer: E

Question 10: Correct Answer: E

Question 11: Correct Answer: C

Question 12: Correct Answer: D

Waves in deep water travel such that the surface is not disturbed, until the level of the water becomes too shallow. So the answer is D. 35% of students got this answer.

Question 13: Correct Answer: E

Question 14: Correct Answer: C

Mitotic metaphase occurs just before the plant cell splits into two. This means that there must be sufficient DNA molecules for two cells, each containing 10 molecules. Therefore the answer is C. 30% of students got this question right.

Question 15: Correct Answer: A

Bacteria does not contain mitochondria, therefore the answer is A. Only 21% of students knew this question.

Question 16: Correct Answer: A

The part of a plant that transports photosynthetic products from leaves to roots is called the phloem. 27% of students knew this was correct.

Question 17: Correct Answer: E

Question 18: Correct Answer: B

This question requires that the candidate understand that rocks are laid down in order from oldest to youngest and that relative order of geological "events" can be understood by examining cross-cutting relationships. Response B is false as it is "cross cut" by R1 and G which are therefore younger events. 49% of students got this answer.

Question 19: Correct Answer: B

The vast majority of folds in rocks are produced by crustal shortening processes. Crustal shortening is a feature of subduction zones where compressional forces cause folding and faulting of the crust adjacent to the descending slab. 33% of students got this question right.

Question 20: Correct Answer: E

All these locations are adjacent to either hot magma or lava and as such would have been subjected to heating and metamorphism. 30% of students got this question right.

Question 21: Correct Answer: D

Question 22: Correct Answer: C

Question 23: Correct Answer: E

Question 24: Correct Answer: C

Question 25: Correct Answer: C