Examples of Educational Assessments using MCT

These are brief examples for a variety of topics/skills levels and not necessarily the best questions. Those in Section B come from validated undergraduate level Introductory Astronomy measures.

A. Questions testing content/factual knowledge:

A1. Typical Mira pulsation periods are of order
   a) 1 hour
   b) 1 day
   c) 10 days
   d) 100 days

A2. Accurate Bolometric magnitudes are ideally obtained using
   a) Observing frequencies over a narrow range
   b) Observing frequencies over a wide range
   c) A single observing frequency

B. Questions testing application of principles learned:

B1. A person is reading a newspaper while standing 5 feet away from a table that has on it an unshaded 100-watt light bulb. Imagine that the table were moved to a distance of 10 feet. How many light bulbs in total would have to be placed on the table to light up the newspaper to the same amount of brightness as before? (From ADT v.2)
   a) One bulb.
   b) Two bulbs.
   c) Three bulbs.
   d) Four bulbs.
   e) More than four bulbs.

B2. Imagine that you are building a scale model of the Earth and the Moon. You are going to use a 12-inch basketball to represent the Earth and a 3-inch tennis ball to represent the Moon. To maintain the proper distance scale, about how far from the surface of the basketball should the tennis ball be placed?
   a) 4 inches (1/3 foot)
   b) 6 inches (1/2 foot)
   c) 36 inches (3 feet)
   d) 30 feet
   e) 300 feet

B3. Consider the 3 stars described below.
   • Star X gives off the same amount of energy as the Sun and gives off most of its energy at a wavelength of 400 nm.
   • Star Y gives off more energy than the Sun and gives off most of its energy at a wavelength of 800 nm.
   • Star Z gives off less energy than the Sun and gives off most of its energy at a wavelength of 600 nm.

Which star is the **coolest**?
> a) Star X.
> b) Star Y.
> c) Star Z.
> d) The relative temperatures of these stars cannot be determined from this information.

C. Questions requiring applied skills
The following question tests application of skills and understanding of conditional probability.

C1. We roll two fair 6-sided dice. Each one of the 36 possible outcomes is assumed to be equally likely. Given that the two dice land on different numbers, find the conditional probability that at least one die roll is a 6
> a) 1/3
> b) 1/6
> c) 1/9
> d) 1/18
> e) 1/36

Answer: There are 30 possible outcomes where the dice land on different numbers. Out of these, there are 10 outcomes in which at least one of the rolls is a 6. Thus, the desired conditional probability is 10/30=1/3 (answer a).