

### Quiz 3

1) Suppose the angular separation of two stars is smaller than the angular resolution of your eyes. How will the stars appear to your eyes?

- A) The two stars will appear to be touching, looking rather like a small dumbbell.
- B) You will not be able to see these two stars at all.
- \* C) The two stars will look like a single point of light.
- D) You will see only the larger of the two stars, not the smaller one.
- E) You will see two distinct stars.

2) Currently, the largest optical telescope mirrors have a diameter of

- A) 2 m.
- B) 1 m.
- \* C) 10 m.
- D) 5 m.
- E) 100 m.

3) What is the purpose of adaptive optics?

- \* A) to eliminate the distorting effects of atmospheric turbulence for telescopes on the ground
- B) to increase the magnification of telescopes on the ground
- C) to improve the angular resolution of telescopes in space
- D) to allow several small telescopes to work together like a single larger telescope
- E) to increase the collecting area of telescopes on the ground

4) Which of the following wavelength regions cannot be studied with telescopes on the ground?

- A) radio waves
- B) ultraviolet
- C) X rays
- \* D) both B and C
- E) both A and C

5) What does the technique of interferometry allow?

- A) It allows astronomers to make astronomical observations without interference from light pollution.
- B) It allows us to determine the chemical composition of stars.
- \* C) It allows two or more telescopes to obtain the angular resolution of a single telescope much larger than any of the individual telescopes.
- D) It allows two or more telescopes to obtain a total light-collecting area much larger than the total light-collecting area of the individual telescopes.
- E) It allows the same telescope to make images with both radio waves and visible light.

6) Which of the following is not a prediction made by the theory of relativity?

\* A) Observers in different reference frames may disagree about the basic laws of nature.

B) No material object sent outward from Earth can reach or exceed the speed of light.

C)  $E = mc^2$

D) Observers in different reference frames may disagree about whether two events in two different places occur simultaneously.

E) Observers in different reference frames may disagree about the time and distance between two events.

7) In relativity, two people share the same frame of reference only if

A) they are both located in the same place.

B) they agree on the laws of nature.

C) they are both located in the same place and are stationary.

D) they are both located in the same place and are traveling at the same speed.

\* E) they are not moving relative to each other.

8) Bob is coming toward you at a speed of 75 km/hr. You throw a baseball in his direction at 75 km/hr. What does he see the ball doing?

A) He sees the ball going away from him at 75 km/hr.

\* B) He sees the ball coming at him at 150 km/hr.

C) He sees the ball coming at him at 75 km/hr.

D) He sees the ball going away from him at 150 km/hr.

E) He sees the ball remaining stationary.

9) You are racing away from Earth in a super spaceship in which you can continually increase your speed. Which of the following best explains how people on Earth will perceive your speed?

A) You may soon be racing away from Earth faster than the speed of light, but, if so, people on Earth will no longer be able to see you.

B) They will know you are going very fast but will have no way of knowing whether you ever exceed the speed of light.

\* C) You will see any beam of light from Earth coming toward you at the speed of light, which means it will catch you. Thus, the people on Earth must conclude that you are going slower than the speed of light.

D) An imaginary spaceship can go as fast as it wants, so the folks on Earth soon will see you going faster than the speed of light.

E) Without more information, it is impossible to know how fast you would see a light beam from Earth coming toward you. If it happens that you are going fast enough so that the light can't catch you, then people on Earth would find you to be going faster than light.

10) How would we view time (clocks) on the spaceship as it goes by?

\* A) Their clocks are going slower than ours.

B) Their clocks are going at the same rate as ours.

C) Their clocks are going exactly half as fast as ours.

D) Their clocks are going faster than ours.

E) Time is the same for everyone.