

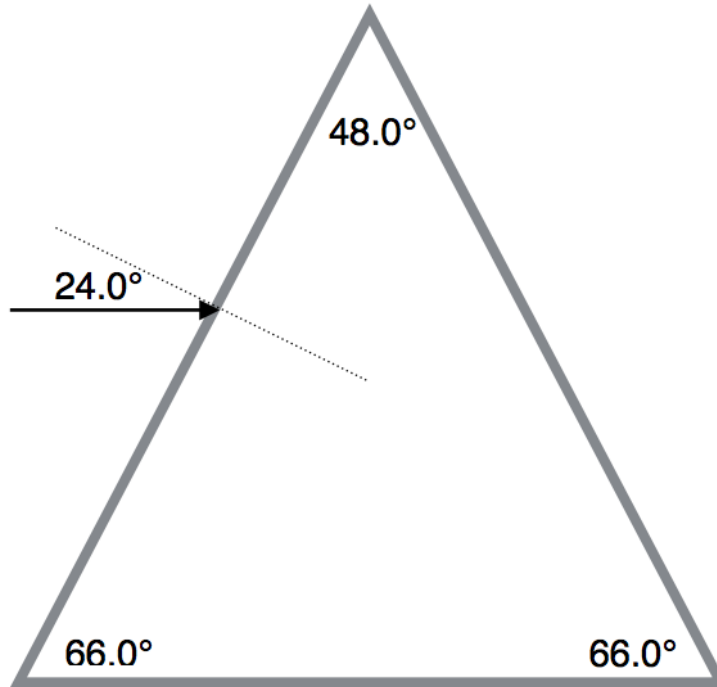
Physics 10164 - Spring 2019 Exam 3E

Partial credit will be given provided you show all work and are solving parts of the problem correctly. Points will be deducted if you don't show your work even if you get the right answer. Clearly indicate your answer with a circle or a box and remember to include correct units and significant figures.

1. (25 pts) The intensity of moonlight during a full moon is approximately 0.024 Watts/m^2 when the moon is high in the sky.
 - a) What is the rms value of the magnetic field associated with this light?
 - b) How much energy in the form of moonlight is contained within the volume of an open football stadium of $350,000 \text{ m}^3$ volume?
 - c) If the playing field has an area of 5100 m^2 , how much time would it take to collect enough energy from moonlight to boil a pot of water? Assume $820,000 \text{ Joules}$ of energy is needed.

2. (25 pts) A mirror has a focal length of +35 cm.
- a) At what object distance does the resulting image have a magnification of +1.8?
- b) If we move the object to a new location, the resulting image has a magnification of -0.35. What is the new image distance?

3. (25 pts) The prism below has an index of refraction of 1.48 for blue light and 1.43 for red light, and the prism is surrounded by air. Light is incident on the left face of the prism as shown. What is the angular separation (2 SF) between the red and blue light that emerges from the right side of the prism?



4. (25 pts) A person has a near point of 48 cm and a far point of infinity. We want to prescribe eyeglasses for this person to correct the near point to be 25 cm. The eyeglasses will sit 2.0 cm in front of the eye.

- a) What must be the focal length of these lenses?
- b) What is the new far point for this person wearing the glasses? Keep in mind that the new far point must account for the extra 2.0 between the lenses and the eye! I am asking what the far point is for the eye, not the lenses.