Optics
Quiz 1 **Name:** _____
2016-2017 **Date:** _____

Answer the questions in the spaces provided. 20 minutes!

1. The two types of reflection are __**specular**__ and __**diffuse**__.

2. The "Law of Reflection" states that

   A. All surfaces reflect at right angles. B. The angle of reflection equals the angle of incidence. C. The angle of incidence is greater than the angle of reflection. D. All surfaces reflect. E. The angle of reflection is 90° to the angle on incidence.

   2. **B**

3. Refraction is

   A. Opposite to reflection. B. The spreading of light. C. The same as reflection, but with non-absorbing materials. D. The bending of light. E. Not affected by the density a material.

   3. **D**

4. The three types of mirrors are flat, __**concave**__, and __**convex**__.

5. **T** (T/F) Flat mirrors have no focal length.

6. The two types of images are real and __**virtual**__.

7. A negative magnification means that

   A. The image is not real. B. The image is smaller than the object. C. The image is inverted. D. The image is larger than the object. E. The image is real.

   7. **C**

8. The radius of a *concave* mirror is 500 cm. What is it's focal length?

   8. **250 cm**

9. The radius of a *convex* mirror is 500 cm. What is it's focal length?

   9. **-250 cm**

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10. An object of hight 10 cm is located a distance of 100 cm in front of a convex mirror of radius 1000 cm.

(a) Where is the image located? A. In front of the mirror. B. Behind the mirror.

(a) **B**

(b) The image is A. Upright. B. Inverted.

(b) **A**

(c) The image is A. Real. B. Virtual.

(c) **B**

(d) The image is A. bigger than the object B. smaller than the object

(d) **B**

(e) How tall is the image?

(e) **8.3 cm**

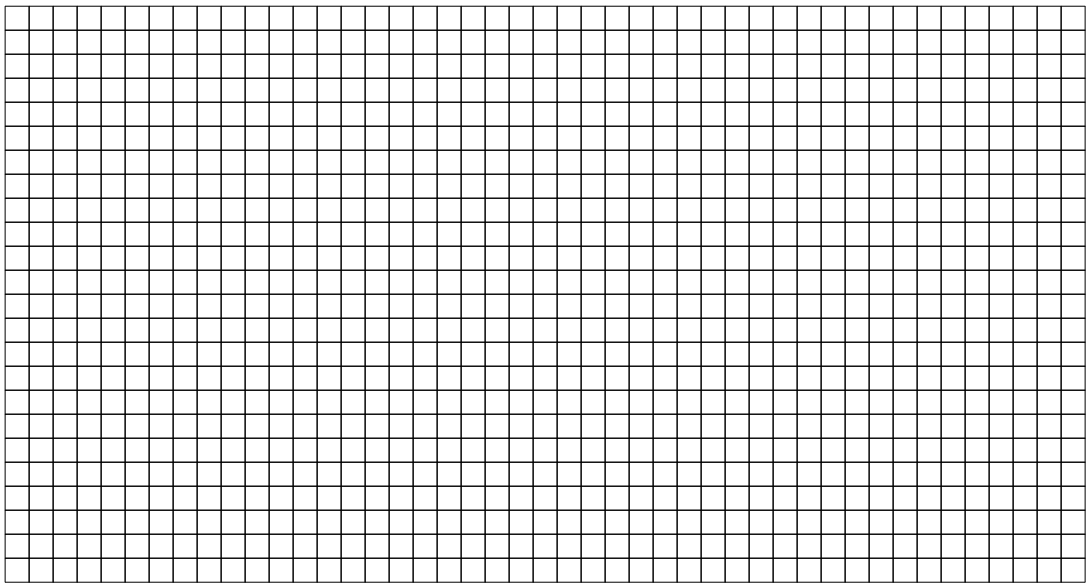
(f) What is the image distance? (Remember the sign!)

(f) **-83 cm**

(g) What is the magnification? (Remember the sign!)

(g) **0.83**

(h) Draw this system and show the ray tracing using the P-ray and F-ray. Label all parts including the object, the image, the center, and the focal point.



11. For a concave mirror with an object in front, when the object distance is greater than the radius of the mirror (i.e. $o > R$), the image is ... (note: $|i|$ means the absolute value of the image distance.)

    A. Virtual, inverted, larger, and $f < |i| < R$
    B. Real, inverted, larger, and $|i| > R$
    C. Virtual, erect, smaller, and $f < |i| < R$
    D. Real, erect, smaller, and $|i| > R$
    E. Real, inverted, smaller, and $f < |i| < R$
    F. Virtual, inverted, larger, and $|i| > R$

11. **E**

12. For a concave mirror with an object in front, when the object distance is smaller than the radius of the mirror and greater than the focal distance (i.e. $f < o < R$), the image is ... (note: $|i|$ means the absolute value of the image distance.)

    A. Virtual, inverted, larger, and $f < |i| < R$
    B. Real, inverted, larger, and $|i| > R$
    C. Virtual, erect, smaller, and $f < |i| < R$
    D. Real, erect, smaller, and $|i| > R$
    E. Real, inverted, smaller, and $f < |i| < R$
    F. Virtual, inverted, larger, and $|i| > R$

12. **B**

13. Professor Thunderbuster has just invented a new amazing material that slows down the speed of light to 8 m/s. He gave the material the name "unobtanium". What is the index of refraction of unobtainium?

13. **37.5×10^6**

14. When calculating the imaging effect of a two-lens system, the image from the first lens is treated as the **object** of the second lens.

15. Three things can happen when light is incident on a different material from the one where it has been traveling in. They are

    A. reflection, refraction, and absorption
    B. dispersion, diffusion, and reflection
    C. absorption, transmission, and isolation
    D. refraction, transmission, and dispersion

15. **A**