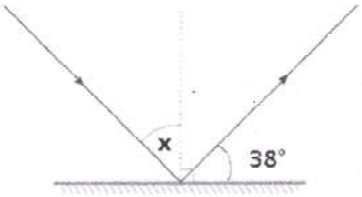
Name: Uni Lee

Lets Ignore my mark.

Multiple Choice: Identify the choice that **best** completes the statement or answers the question on the **Scantron** card. **ONLY** the Scantron will be marked.

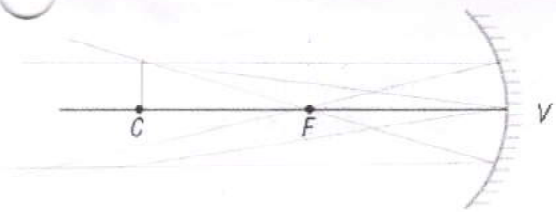
1. You are holding a flashlight so the beam strikes a plane mirror. The angle between the reflected light ray and the mirror is 38°. What is the incident angle?



(a) 38°
(b) 52° ✓
(c) 90°
(d) 155°

2. Fluorescent light bulbs light up when electricity passes through:
(a) a tungsten wire
(b) a liquid
(c) mercury vapour ✓
(d) neon gas

3. Where would you place an object in order to get an image that is the **same size** as the object itself?



(a) at C
(b) between F and V
(c) between F and C
(d) at F

4. A camera takes light from large, distant objects and forms what kind of image?
(a) small, real, inverted
(b) enlarged, real, inverted
(c) small, virtual, inverted
(d) enlarged, virtual, upright

5. Every converging lens has two focal points. What determines which one is the principal focus and which is the secondary principal focus?
(a) the curve of the lens
(b) the distance of the object from the lens
(c) the magnification of the lens
(d) the direction in which the light rays from the object are entering the lens

6. Which kind of mirror would you put at the end of a parking lot in order to let you see as wide a view of the street as possible?
(a) converging mirror
(b) diverging mirror
(c) plane mirror
(d) none of the above

7. Which type of mirror always produces a smaller image compared to the original size of the object?
(a) concave (b) convex (c) plane (d) none of these

8. Through which type of material does light pass most easily?
(a) translucent (b) reflective (c) transparent (d) opaque (e) none of these

9. Which of the following is TRUE about the electromagnetic spectrum?
(a) All electromagnetic waves are invisible.
(b) Electromagnetic waves of low frequency have high energy.
(c) Electromagnetic waves with short wavelengths have low energy.
(d) Electromagnetic waves have both electric and magnetic properties.

10. Plane and convex mirrors always form _____ images.
(a) real (b) virtual (c) refracted (d) diverging rays (e) none of these

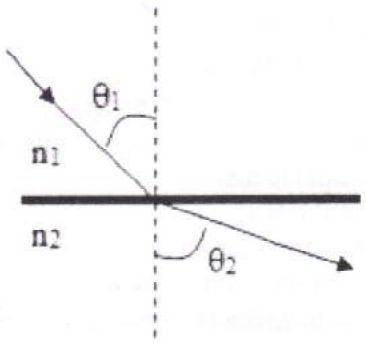
11. If an object is placed _____ in front of a concave mirror, there will be no image, just a blur.
(a) at the center of curvature (b) at the focal point (c) between C and F (d) between F and V

12. When the angle of incidence equals or is greater than the critical angle...
(a) ...total internal reflection occurs.
(b) ...50% of the light rays will be refracted.
(c) ...all light rays are refracted out of the medium.
(d) ...light rays will pass straight into the new medium without bending.
(e) none of above

13. Which of these objects is considered luminous?
(a) a tree (b) a mirror (c) a lit match (d) a diamond (e) none of these

14. Light travels _____ in cool air than in warm air.
(a) faster (b) slower (c) same speed (d) virtual

15. Which of the following correctly compares the index of refraction between the two mediums in the diagram to the right?



(a) $n_1 < n_2$ (c) $n_1 > n_2$
(b) $n_1 = n_2$ (d) None of the above.

Matching: Mark the correct response on your Scantron card.

16. Incandescence
17. Phosphorescence
18. Chemiluminescence
19. Bioluminescence
20. Triboluminescence

(a) Production of light from friction
(b) Light produced by a chemical reaction.
(c) Light produced over time resulting from the absorptionof ultraviolet light.
(d) Light produced by electric current passing through gas.
(e) Light is produced as a result of high temperatures.
(ab) Production of light in living things.

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NAME	Uni Lee	
SUBJECT	Science	TEST NO. Physics
DATE	June 5, 2013	PERIOD 2

TEST RECORD	
PART 1	
PART 2	
TOTAL	

IMPORTANT

USE NO. 2 PENCIL ONLY

- MAKE DARK MARKS
- ERASE COMPLETELY TO CHANGE
- EXAMPLE: (A) (B) (D) (E)

TO USE SUBJECTIVE SCORE FEATURE:

- Mark total possible subjective points
- Only one mark per line on key
- 163 points maximum

EXAMPLE OF STUDENT SCORE:

SUBJECTIVE SCORE INSTRUCTOR USE ONLY

100	90	80	70	60
50	40	30	20	10
9	8	7	6	5
4	3	2	1	0

PART 1

KEY: (T) % (F) 2 3 5

1	A	F	C	D	E
2	A	B	C	D	E
3	A	B	C	D	E
4	A	B	C	D	E
5	A	B	C	D	E
6	A	B	C	D	E
7	A	B	C	D	E
8	A	B	C	D	E
9	A	B	C	D	E
10	A	B	C	D	E
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19	A	B	C	D	E
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21	A	B	C	D	E
22	A	B	C	D	E
23	A	B	C	D	E
24	A	B	C	D	E
25	A	B	C	D	E

D E B C E

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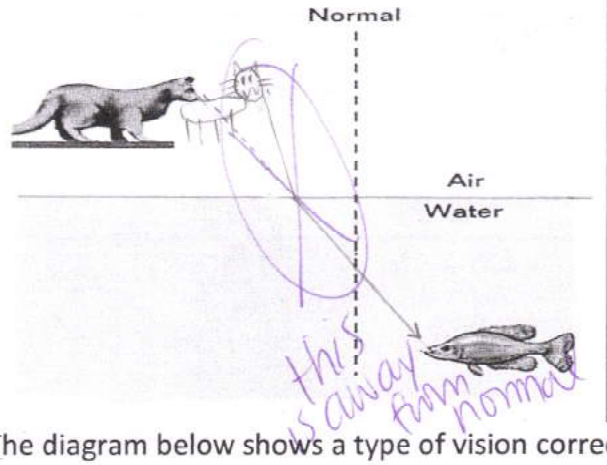
Thinking and Inquiry [11]

21. Using your knowledge of refraction, draw, *using a ruler*, a ray diagram to show **where the fish would see the cat**. Be sure to state and explain where the image of the cat is with respect to the cat. [4]

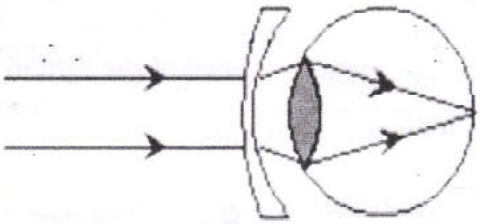


Explanation:

the fish would see the cat closer because ligh rays bend when entering new medium. bends towards normal because light moves faster in air than water

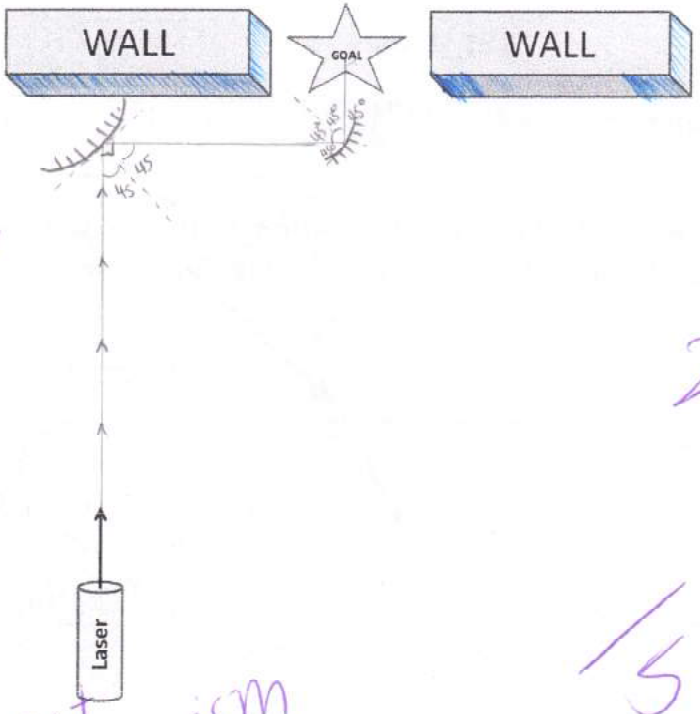
22. The diagram below shows a type of vision correction lens. Complete the chart below. [4]

Name of corrective lens: diverging lens converging lens	Scientific name of eye disorder: near sightedness - myopia
State the characteristics of this eye disorder	retina and lens too far away cant see far away
How does this lens correct this eye disorder	lets you see far. collects light from far away



23. You have been given the task of hitting the Star GOAL with a laser in a maze. The laser, StarGOAL, and walls cannot be moved. You are given 2 triangular prisms (critical angle is 35°), 1 concave mirror, and 1 convex mirror. You may use some or all the optical items given to you to complete the task.

a) Draw the placement of the optical items with a ray diagram showing the laser's path to the Star GOAL. Be sure to measure and include your angles. [2]



b) State the physics principal(s) you used to draw the diagram to the right? [1]

light enters prism but reflects out all light is reflected

you did not use a prism

Application/14 (Make sure to use the GRASP/GRASS method of solving a problem.)

Useful formulas and constants: *Index of refraction: air: 1.00 Glass: 1.59 Diamond: 2.42 Oil: 1.45*

Speed of light in a Vacuum = 3.0 x 10^8 m/s $\quad n = \frac{c}{v}$ $\quad n_i \sin\theta_i = n_R \sin\theta_R$

24. Calculate the critical angle, to the nearest degree, as light travels from glass to oil. [3]

Given: $n_i = 1.59$ $\quad c = 3.0 \times 10^8$ m/s $\quad \theta_R = ??$ $n_R = 1.45$	**Required:** $\theta_R = ?$
Analysis: $n_i \sin\theta_i = n_R \sin\theta_R$ $\quad n = \frac{c}{v}$	
Solution: Speed of light in glass $= \frac{3.0 \times 10^8 \text{ m/s}}{1.59}$ $\quad n = \frac{c}{v}$ $\quad 1.59 \sin\theta_i = 1.45 \sin\theta_R$ $= 1.88 \times 10^8$ m/s $\quad 0.027\,\theta_i = 0.025\,\theta_R$	
Statement: Therefore, the critical angle as light travels from glass to oil is	

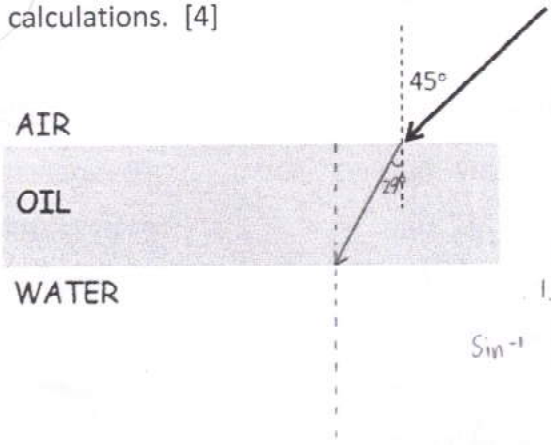
1.5

25. Calculate the speed of the light in diamond. Write your final answer in scientific notation. [3]

Given: $c = 3.0 \times 10^8$ m/s $n = 2.42$	**Required:** $v = ?$
Analysis: $n = \frac{c}{v}$	
Solution: $2.42 = \frac{3.0 \times 10^8 \text{ m/s}}{v}$ $v = \frac{3.0 \times 10^8 \text{ m/s}}{2.42}$ $v = 1.24 \times 10^8$ m/s	
Statement: Therefore, light travels at 1.24×10^8 m/s through a diamond	

3

26. Draw the ray of light as it passes from air to oil to water. Include all angles, to the nearest degree, and calculations. [4]



$n_i \sin\theta_i = n_R \sin\theta_R$
$1.00 \sin 45° = 1.45 \sin\theta_R$
$\left(\frac{0.707}{1.45}\right) \sin^{-1} = \theta_R$
$\theta_R = 29.18°$

$n_i \sin\theta_i = n_R \sin\theta_R$
$1.45 \sin 29° = \sin\theta_R$
$\sin^{-1}\left(\frac{0.703}{}\right) = \theta_R$

2.

6.5

Thin Lens Equation: $\frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f}$ **Magnification Equation:** $M = \frac{h_i}{h_o} = -\frac{d_i}{d_o}$

6.5

27. A 2.5cm high object is placed 10.0cm from a diverging lens with a focal length of 5.0cm.

a) Determine the image distance (round to 2 decimal places) from the lens, and the type of image formed. [4]

Given: $d_o = 10\text{ cm}$ ~~$f = 5\text{ cm}$~~ $f = -5$
$h_o = 2.5\text{ cm}$

Required: $d_i = ?$

Analysis: $\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$

Solution:

$\frac{1}{5} = \frac{1}{10} + \frac{1}{d_i}$

$\frac{1}{5} - \frac{1}{10} = \frac{1}{d_i}$

$\frac{2}{10} - \frac{1}{10} = \frac{1}{d_i}$

$\frac{1}{10} = \frac{1}{d_i}$ → $d_i = 10\text{ cm}$

2

Statement: therefore, the image distance is 10 cm

Type of image: real

b) Determine the height (round to 2 decimal places) and attitude of the image.[4]

Given: $h_o = 2.5\text{ cm}$ $f = 5\text{cm}$
$d_o = 10\text{ cm}$ $d_i = 10\text{cm}$

Required: $h_i = ?$

3.5

Analysis: $\frac{h_i}{h_o} = -\frac{d_i}{d_o}$

Solution:

$\frac{h_i}{2.5\text{cm}} = -\frac{10\text{ cm}}{10\text{ cm}}$

$\frac{h_i}{2.5\text{cm}} = -\frac{1}{1}$ → $h_i = -2.5\text{cm}$

Statement: therefore, the image height is -2.5 cm

Attitude of image: upside down

c) Determine the magnification (round to 2 decimal places) of the lens.[2]

Given: $h_i = 2.5$
$h_o = 2.5$

Required: $M = ?$

Analysis: $M = \frac{h_i}{h_o}$

Solution:

$M = \frac{2.5}{-2.5}$

$M = -1$

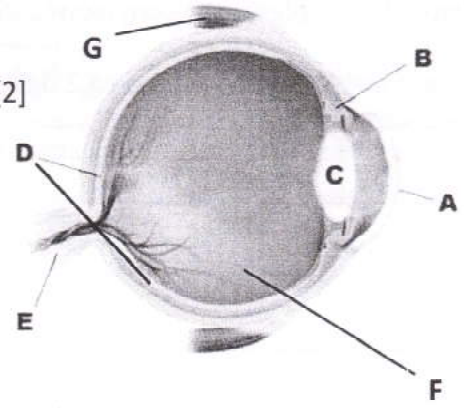
2

Statement: therefore, the magnification is $-1\times$

7.5

Communication [14]

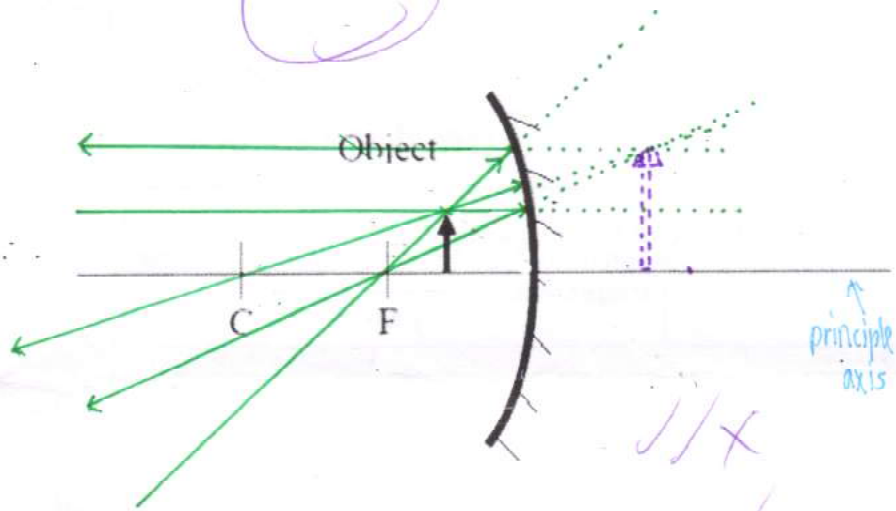
26. Complete the chart be labelling the indicated eye parts. [2]



A: cornea ✓	E: optic nerve ✗
D: retina ✓	C: lens ✓

1.5

27. Construct a ray diagram to find the image of the arrow, by using **at least 2** different **incident rays**. Label the principle axis and the type of mirror. Identify the image characteristics in the box provided. [6]



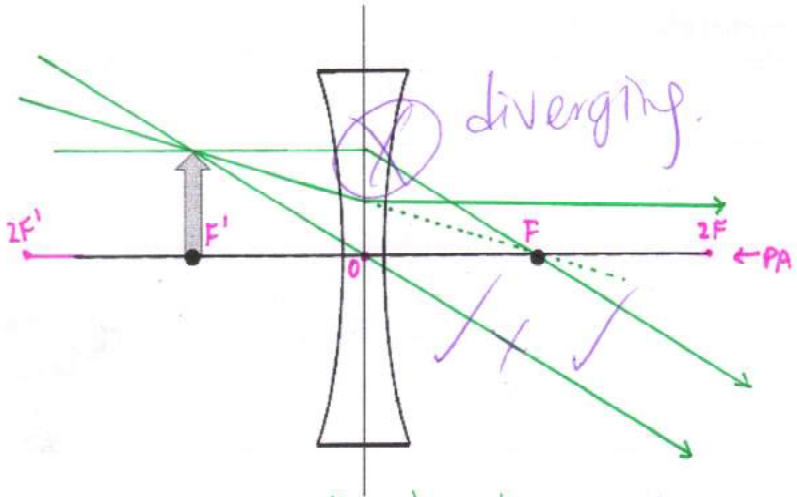
Type of mirror: concave mirror ✓

Image Characteristics:

Size	larger ✓
Attitude	upright ✓
Location	behind mirror before virtual focus
Type	virtual ✓

5

28. Construct a ray diagram to find the image of the arrow, by using **at least 2** different **incident rays**. **Include labels** for principal focus(F), secondary focus(F'), principal axis (PA),optical centre (O) and type of lens.[6]



Type of lens: diverging lens ✓

Image Characteristics:

Size	no image
Attitude	
Location	
Type	

3

9.5