The Brigade School@ G and W

Total points 20/30

Class 10 | Physics | Internal Assessment 2

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Class: *

10 A

✓ 1. Calculate the heat capacity of a copper vessel of mass 300g if the specific heat capacity is 420 J/kgK. * 3/3

Mass = 300g
Specific Heat Capacity = 420J/kgK
Heat Capacity = Specific Heat Capacity x Mass = 420 x 0.3 = 42 x 3 = 126JK^-1

Thus heat capacity is 126 JK^-1

Feedback

m= 300 g = 0.3 kg
Heat capacity = mass x Sp. heat capacity
Heat capacity = 0.3 x 420 = 126 J/K

✗ 2. A piece of ice of mass 80 g is dropped into 400g of water at 50ºC. Calculate the final temperature of water after all the ice has melted. Specific heat of water = 4200J/kgºC and sp. latent heat of ice = 336000 J/kg. * 0/4

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Feedback

Cold body = mL+mc∆t
Hot body = mc∆t
Finalk temperature = T
mL+mc∆t = mc∆t
80/1000 x 336000 +80/1000 x 4200(T- 0) = 400/1000 x 4200 (50-T)
26880 +336 T = 84000- 1680T
2016 T = 57120
T = 57120/2016= 28.3 ºC

✗ 3. A nucleus X of mass number 180 and atomic number 72 undergoes the following emissions in the sequence of beta, alpha, alpha and gamma to form nucleus Y. Write the radioactive reaction. * 1/3

180 X 72 ---Beta Emission---> 180 X 73 ---Alpha Emission---> 176 X 71 ---Gamma---> 176 X 71 + Y

Feedback

180 X 72 beta --> 180 B1 73 alpha --> 176 C 2 71 alpha --> 172 D3 69 gamma --> 172 Y 69

✗ 4. The power of a lens is -4D. Find the focal length of the lens in m and cm. State its type with reason. * 1/2

Power of lens = -4D
P = 1/f
f = 1/P
f = 1/-4
f = -0.25m = -25cm

Thus focal length is -0.25m or -25cm

Feedback

P= -4 D
P= 1/f(in m) f= 1/ P= 1/-4 = -0.25 m = -25 cm
Concave because focal length is negative

✕ 5. An object is placed at a distance of 24 cm from a convex lens of focal length 16 cm. Find (i) position of image (ii) nature and size of image (with reason). * 3/4

u = - 24cm
f = + 16cm

1/f = 1/v - 1/u
1/v = 1/f + 1/u
1/v = 1/16 + 1/-24
1/v = (-24+16)/(16 x -24)
1/v = -8/-384
v = 384/8
v = 48 cm

m = v/u = 48/24 = 2

(i) 48cm behind the lens
(ii) Real, Inverted and Magnified because the image is formed behind the lens.

Feedback

Lens- convex
u= -24 cm
f= 16 cm
v=?
1/v-1/u = 1/f
1/v = 1/16-1/24 = 1/48
v= 48 cm
Image is formed 48 cm behind the lens
Object is between F and 2F so it will be real, inverted and magnified

✕ 6. A convex lens of focal length 20 cm forms a real image of the same size as the object. Find image distance. * 0/2

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Feedback

Image is same size so object is at 2F. So image is at 2F on the other side
v= 2 x f = 2x 20 = 40 cm

✓ 7. An object of height 2 cm is placed in front of a convex lens of focal length 20 cm at a distance of 15 cm. Find position, magnification, size and nature of image. * 4/4

O = + 2 cm
f = + 20 cm
u = - 15 cm

1/v - 1/u = 1/f
1/v = 1/f + 1/u
1/v = (1/+20) + (1/-15)
1/v = 5/-300
1/v = 1/-60
v = - 60 cm

m = v/u
m = -60/-15 = 4

m = I/O
4 = I/2
I = 8cm

Position - 60cm in front of the lens
Magnification - 4
Size - 8cm
Nature - Virtual, Upright and Magnified

Feedback

v = -60 cm
so image is in front of the lens
m = v/u = -60/-15 = 4
m is positive so image is virtual and erect
object height = 2 cm
Image height = 2 x 4 = 8 cm

✓ 8. A coin kept inside water (ref. index = 4/3)is viewed from air in a vertical direction and it appears raised by 4 mm. Find the depth of the coin in water. * 3/3

Refractive Index = 4/3
Shift = 4mm
Let real depth be 'x', then
Apparent Depth = Real Depth / Refractive Index = x/(4/3) = 3x/4
Shift = Real Depth - Apparent Depth = x - 3x/4 = x/4, but shift = 4mm, so,
4mm = x/4 => x = 16mm.

Thus depth of the coin in water is 16mm or 1.6cm

Feedback

Ref index = 4/3
Shift = 4mm
Let real depth be x
Apparent depth = x-4
App depth = depth/ ref index
x-4= 3x/4
4x-3x= 16
x=16mm

✓ 9. An atom X has 92 protons and 146 neutrons and is radioactive, It becomes B with mass number 234 and atomic number 90 by emitting a particle. (i) What is the mass number of X? (ii) What is the particle emitted? (iii) Give reason for your answer in (ii). (iv) Write the change from X to B as a reaction. (v) Will the composition of B change if it emits gamma radiation? Justify. * 5/5

(i) 238
(ii) Alpha Particle
(iii) In the reaction, the mass number decreases by 4(i.e from 238 to 2354) and atomic number decreases by 2(i.e from 92 to 90), which occurs in an Alpha Emission.
(iv) 238 X 92 -----Alpha Emission-----> 234 B 90
(v) No, the composition won't change because the Gamma Ray takes no mass and electric charge from the nucleus which mean electrons and protons are not lost, thus there will be no change in the composition of B.

Feedback

i) mass number of X = no. of protons + no. of neutrons
= 92 + 146
mass number of X = 238

(ii) particle emitted is alpha particle

(iii) this is because , the resultant nucleus B's mass number is short by 4 and atomic number is short by 2.
this happens in alpha emission, therefore, the particle emitted is an alpha particle.

(iv) 238 X 92 (alpha emitted) --> 234 B 90

(v) No, it will not change since gamma radiations do not carry any charge. Due to this there will be no change in the atomic or mass number of the nucleus. Hence there will be no change in its composition.