Physics Bootcamp Answers

Get to it

Q1 B
Q2 A
Q3 B
Q4 B
Q5 D
Q6 B
Q7 A

$2 \times 10^3 \div 10^4$

$\frac{2 \times 10^3}{1 \times 10^4} = 2 \times 10^{-1}$

$= 0.2$

$\lambda = \frac{V}{f} = \frac{340}{1360}$

Q8 B
Q9 D
Q10 Sound energy to electrical energy

256Hz
x5

Q11(a) 1 280 times

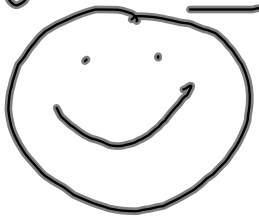
Q 11b) 1.3 metres
Q12 800 seconds
Q13 Wavelength = 3.5 cm to 3.8 cm

1 wave → 0.2s
5 waves → 1s

Q14(a) 5 Hz
0.1 m/s
0.02 m

5Hz

$V = \frac{d}{t} = \frac{0.3m}{3s} = 0.1m/s$



$V = f \times \lambda$

$\frac{V}{f} = \lambda$

$\frac{0.1}{5} = 0.02m$

Speed of sound = 340 m/s

Speed of light = 3×10^8 m/s

Smith sees smoke speed of light = shortest time.

$$t = \frac{d}{v} = \frac{100}{3 \times 10^8} = 3 \times 10^{-7}\ s$$

$$t = \frac{d}{v} = \frac{100\ m}{340\ m/s} = 0.3\ sec$$

March 4th Health Q1 to Q7

1 C
2 A
3 B
4 C
5 C
6 D
7 A

March 5 Health Q8 to 14

8 B
9 B
10 A
11 C
12 D
13 D
14 0.16 s

March 6 H1 15 to 19

15 Centred around 37C Max 39 Min 28
16 Traffic/ Airport/ Noisy street
17 4×10^{-5} s
18 3 000 complete vibrations every second
19(a) (i) Any sound which ha a frequency between 20Hz and 20kHz
(ii) 2×10^{-4} s
(b) Imaging unborn babies
(c) Non ionizing

7th March Electricity 1 Qs 1 to 7

1A

2B

3C

4A

5A

6A

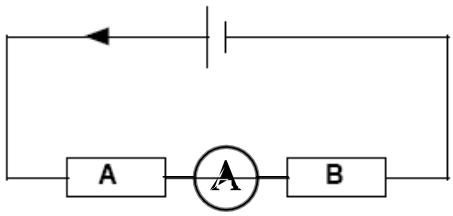
7B

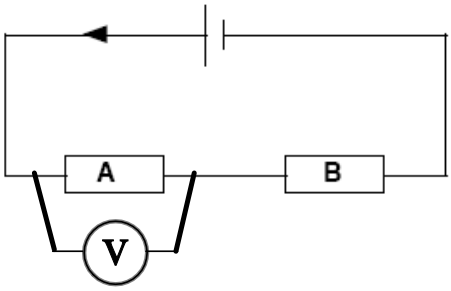
March 8 Electricity 1 Qs 8 to 14

9D

10D

11





13Earth/plastic insulator

14 Plastic pipe is an insulator

March 9th UE 1 Qs 15 to 20

15 Plastic pipes are insulators. So the electricity could not flow through it into the ground. Appliance would still be live.

16 As above the current would not flow to the ground leaving the appliance`s case still live.

17 A large current to flow to earth via the earth wire.
This causes the fuse to melt isolating the live wire from the casing.

18 Use Q = Ixt Q = 2 x (5x60) = 600 Coulombs

19 Use I = Q/t I = 40/8 = 5 amps

20 Use t = Q/I t = 30/2 = 15 seconds

March 10 Transport 1 Qs 1 to 7

1 Use d = V x t d = 4 x 40 = 160m answer D

2 Use t = d/V t = 240/30 = 8 hours answer C

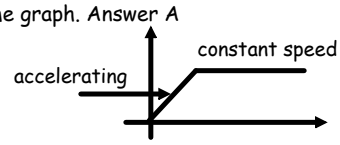
3 Use V = d/t V = 6000m / (5x60sec) = 6000m/300s = 20m/s answer B

4 Light year is the distance travelled by light in one year....used in Space Topic answer C

5 Distance gone is the area under a speed time graph. Answer A

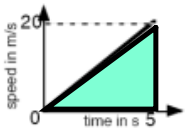
6 Answer C

7 Answer D



March 11th Transport Q 8 to 14

8 Area = ½ x 5 x 20 = 50m answer C



9 a = (10 - 0)/ 5 = $2ms^{-2}$ answer B

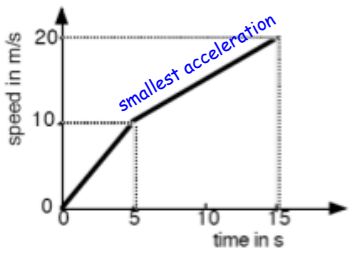
10 a = (10-4)/10 = 0.6 ms^{-2} answer B

11 Increase in speed = at = 2 x 4 = 8 m/s
Now add on its original speed 8m/s + 3 m/s = 11m/s Answer B

12 Smallest acceleration is the less steep slope
a = (20-10)/10 = $1m/s^2$

13 a = (change in speed)/time taken
a = (40 -0)/8 = 5 ms^{-2}

14 With a deceleration of 2.5m/s every second then 35/2.5 = 14 sec.
Or since a = ΔV/t then t = ΔV/a

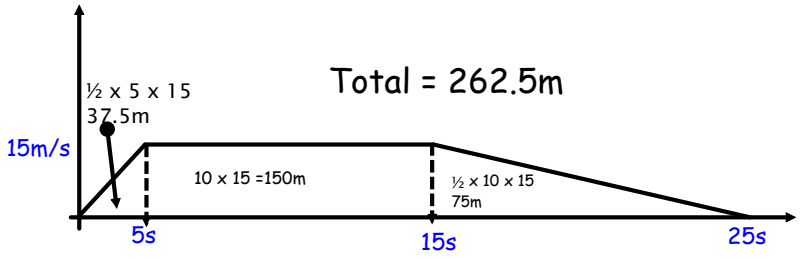


March 12th Transport Q 15 to 17

15)a) Change in speed = acceleration x time
= 2 x 5
= 10 m/s

b) We dont know the time

16 Change in speed = acceleration x time
= 1 x 3
= 3 m/s so final speed = initial speed + change in speed
= 14 m/s + 3 m/s = 17m/s



March 13 Energy Matters Q1 to 7

1. A
2. D
3. Think like a test 5/50 = 10% B
4. D
5. C
6 Just forget this equation answer B
7. C

March 14 Energy Matters Q8 to 11

8. Primary → Secondary (÷ 29)
T = 29 → 1
V = 230 → 8
answer A

9. Think test marks for efficiency 18/300 = 6%
There must be 94% wasted

10. 80% gives 6W
100% gives (100/80) x 6W = 7.5 W

11. Primary → Secondary (÷ 30)
30 → 1
6000 → 200

12 Leave this question out.

13 (a) 2 lamps at 24 W each, so total power = 48W
(b) One lamp is rated 12V 48 W so use P = VI to get current.
I = P/V = 48/12 = 4 Amps. So total current = 8 Amps

(c) Primary → Secondary (÷19 / x19)
230 V → 12V
0.42 A → 8A
950 → 50 Turns

March 15 Telecom H2 Q 1 to 10

1A 2C 3D 4B 5B 6D 7A 8A 9A 10 C

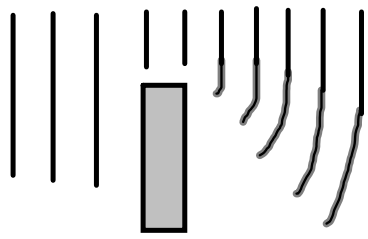
March 16 Telecom H2 Q11 to 16

11. (a) 200 000 Hz
    (b) 200 kHz

12 Use $V = f \times \lambda$ $1200\,000 \times 250 = 3 \times 10^8$

13. 200 km

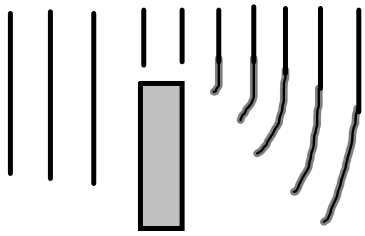
14.



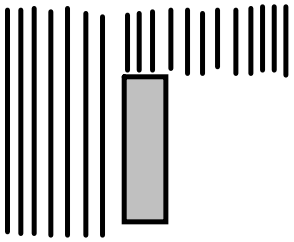
Diffraction

15. Cheaper than copper and can carry much more signals

16 (a) Longer wavelength = shorter frequency because f = speed/wavelength
623 MHz = 623 000 000 Hz 1089 kHz = 1089 000Hz
So longer wavelength has the shortest frequency = 1089kHz
(b) Longer waves diffract better. So tv waves which have shorter waves don`t bend around objects



Long wavelengths



short wavelengths

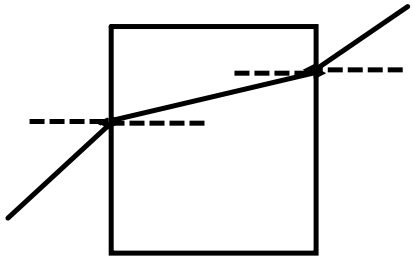
March 17 Health 2 Q 1 to 7

1C 2B 3D 4C 5C 6C 7B

March 18 Health 2 Q 8 to 14

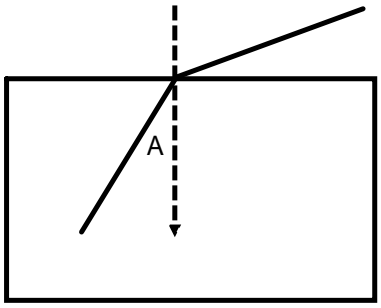
8A 9C

10

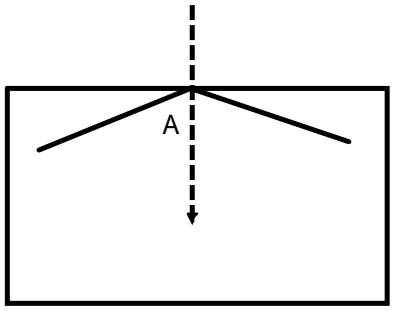


Mistake it should read refracted ray

11



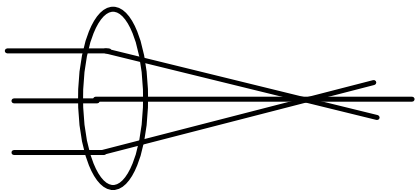
angle A is less than critical angle
so will leave the block.
A ray going from glass to air always bends away from the normal line.

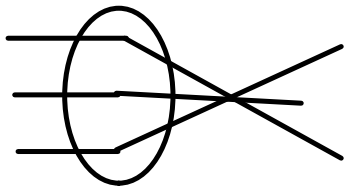


Angle A is bigger than the critical angle so total internal reflection occurs.

12 Total internal reflection

13





Thicker lens shorter focal length.

14 $f = \frac{1}{P}$

f = 1/20 = 0.05m = 5cm

f = 1/2.5 = 0.8m = 80cm

f = 1/10 = 0.1m = 10cm

f = 1/14 = 0.07m = 7cm

f = 1/2 = 0.5m = 50cm

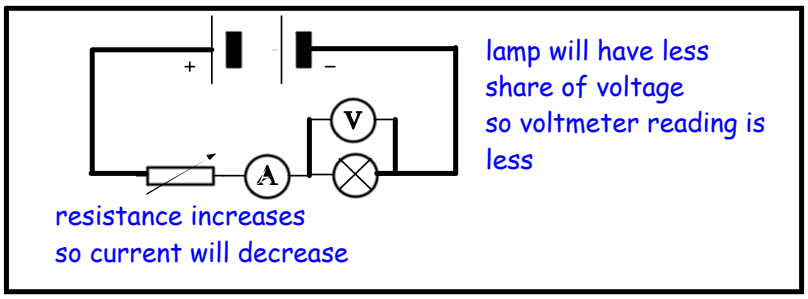
March 19 Using Electricity Q 1 to 7

1B (in a series circuit the current is the same all around it)
2A
3D (any component in series will have the same current through them)
4D (ammeters must have very low resistance so that the current will flow through it.
5A smallest resistance takes the biggest current
6C
7A Series resistors split up the voltage. Voltage is the same across parallel resistors.

March 20 Using Electricity Q 8 to 14

8A
9C
10B

11A



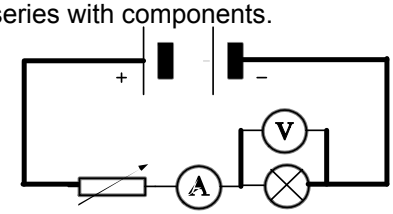
12 A Lamp X Current = Q/t
= 20/10
= 2 Amps
lamp Y Current = 40/5
= 8 Amps

13 C This is an old question but all you need to know is that ammeters must have a very low resistance and voltmeters very high resistance.

14 D Q = I x t
Q = 2 x 10
Q = 20 Coulombs

March 21 Using Electricity Q 15 to 19

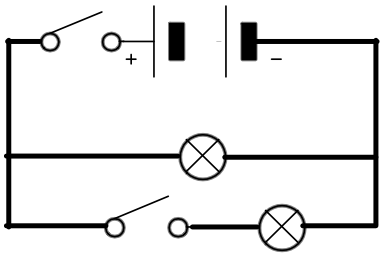
15 You must know that voltmeters must be connected across components.
Ammeters must be connected in series with components.



16 P =4 amps Q = 4 amps
P = 2 amps Q = 5 amps

17 (a) only switch S1
(b) S1 & S2
(c) No. There is no switch to disconnect the heater.

18



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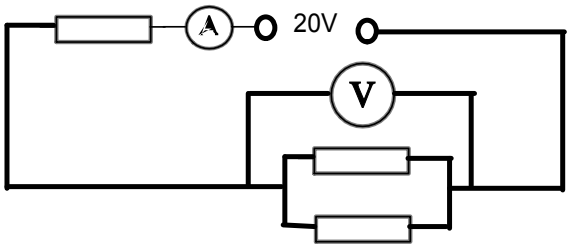


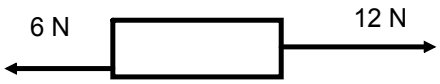
March 22 Transport H2 Questions 1 to 7

1 D
2 B (increases its speed then friction from the water makes the forces balanced so speed will be constant, This is the same as the sky diver jumping out a plane.)
3 C
4 B (Uniform acceleration means constant acceleration)
5 D
6 A
7 B
8 D (It is the force that kills you as you hit something)

March 23 Transport H2 Questions 8 to 12

8 D (It is the force that kills you as you hit something)

9 C
10 B
11 B
12 A



accelerates at $2 m/s^2$

Find the unbalanced force

F = 12 N - 6 N
F = 6 N
m = F/a
m = 6/2
m = 3 kg

13 (a) 2N to the right
(b) 2N to the left

14 Unbalanced force = 3N to the rght
Acceleration = F/m = 3/3 = 1 m/s^2

15 F = ma
F = 80 x 1.6
F = 128 N

16 No acceleration since no unbalanced force.

17 F = ma
F = 1200 x 0.5
F = 600 N

18 Mass is the same
Weight = mass x gravity
= 90 x 1.6
= 144 N

March 25th Energy Matters Q 1 to 7

1 D remember the I^2R loses. Step up the voltage and you step down the current.

2 Use $P = V^2/R$ so $P = 200^2/0.5$ This gives 80,000W Ignore answers. Question is wrong.

3 These are not good questions. The needle should move to x then to o then move to y and then o

4 $E = cm\Delta T$
$E/(m\Delta T) = c$
$8000/(2 \times 10)$ answer D Oh my they have got it right at last!

5 $E = cm\Delta T$
$\Delta T = E/cm$
$\Delta T = 42000/(4200 \times 0.5)$
$\Delta T =$ 20 degrees answer D make sure you change the 500g into 0.5kg

6 Energy supplied = Power x time = $50 \times (4 \times 60) = (50 \times 4 \times 60)$
Now use $\Delta T = E/cm$
$\Delta T = (50 \times 4 \times 60)/(400 \times 2)$ = answer C

7 $E = mL$ where m = mass of substance melting and L = specific latent heat of fusion
$E = 0.05 \times 334{,}000$ answer B. Watch out for changing 50g into kilogrammes.

March 26th Energy Matters Q 8 to 14

8 $E = mL$ so $L = E/m$ this gives $L = 3{,}200/ 0.005 = 640{,}000$J/kg oops wrong answers again.

9 This calculation has to be done in two steps.
1st. Find out how much energy is needed to raise 2kg of ice at -18C to 0C
$E = cm\Delta T$
$E = (2100 \times 2 \times 18)$ you have to use the specific heat capacity of ice = 2100J/kgC

Now find the energy required to melt, ie change the state of the ice.
$E = mL$
$E = 2 \times 334{,}00$ use the specific heat of fusion(melting) of ice = 334,000J/kg

Now add the two together $(2100 \times 2 \times 18) + (2 \times 334{,}000)$ answer C

10 Radiation only

11 Liquids and gases only

12 One with the black surface

13 C

14 D The house where there is the biggest temperature difference.

March 27th Energy Matters Q 15 to 18

15. 1st Step: Find the energy supplied.
Use E = P x t
E = 60 x (10 x 60) remember to change 10 minutes into seconds by x 60
E = 36,000 J

2nd Step: Work out how many Joules actually went into the piece of metal.
36,000J - 3,000J = 33,000J

3rd Step: Use the equation $E = cm\Delta T$
$c = E/m\Delta T$
$c = 33{,}000 / (3 \times 25)$
$c = 660$ J/kgC

16 0C this is the temp at which ice melts

17 100C

18 Water: Changing state so use E = mL where L = specific latent heat of vaporisation of water = 2.26×10^6 J/kg
$E = 0.02 \times 2.26 \times 10^6$
E = 45,200 J

ICE: Melting ice at 0C gives E = mL where L = specific latent heat of fusion of water = 3.34×10^5J/kg
E = m x L
$E = 0.135 \times 3.34 \times 10^5$
E = 45,090 J

So it is the boiling of water that needs the most energy.

Well done if you have completed this months bootcamp and corrected all your work. You are nearly there. Just a few more weeks of study and then you ca relax.
Best of Luck from Mr Mallon.