3.10 Physics Equations: Recall, Rearrangement and Application: Test Pack

AQA 8464 · Calculator allowed · about 25 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

SECTION 1: RECALL. The equations below are all on the list of equations you must memorise for AQA GCSE Physics. No equation is given here - write down each one from memory, in words or in symbols.

1 **(a)** Write down the equation that links work done, force and distance moved in the direction of the force. **(1)**

.....

(b) Write down the equation that links the force needed to stretch a spring to its spring constant and extension. **(1)**

.....

(c) Write down the equation that links distance travelled to speed and time. **(1)**

.....

(d) Write down the equation that links acceleration to the change in velocity and the time taken. **(1)**

.....

(e) Write down the equation that links resultant force to mass and acceleration. **(1)**

.....

(Total for Question 1 is 5 marks)

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2 An electric kettle transfers 252 kJ of energy to the water in it over 120 s. Using P = E/t, calculate the power of the kettle, in watts.

(Total for Question 2 is 3 marks)

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3 A local radio station broadcasts on a frequency of 97.6 MHz. Radio waves travel at a speed of 3.0×10^8 m/s.

(a) Using $v = f \lambda$, calculate the wavelength of the signal. Give your answer in metres, to 2 significant figures. **(3)**

.....

(b) A different station broadcasts on a long-wave frequency of 198 kHz. Using the same method as part (a), calculate the wavelength of this signal, and state which of the two stations (97.6 MHz or 198 kHz) has the longer wavelength. **(2)**

.....

(Total for Question 3 is 5 marks)

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4 These rearrangements need an extra step.

(a) GPE = mgh. Make h the subject. **(1)**

(b) V = IR. Make R the subject. **(1)**

(c) KE = 0.5 m v^2. Make v the subject. **(2)**

(Total for Question 4 is 4 marks)

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5 A drawing pin has a sharp point with a cross-sectional area of 0.80 mm^2. Using p = F/A, calculate the pressure exerted on a noticeboard when a force of 12 N is applied to the pin. Give your answer in pascals, in standard form.

(Total for Question 5 is 3 marks)

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Mark scheme · 3.10 Physics Equations: Recall, Rearrangement and Application: Test Pack

Question 1

(a) work done = force x distance moved along the line of action of the force (W = Fs), oe **B1**

(a) Answer: work done = force x distance (W = Fs)

(b) force = spring constant x extension (F = ke), oe **B1**

(b) Answer: force = spring constant x extension (F = ke)

(c) distance travelled = speed x time (s = vt), oe **B1**

(c) Answer: distance travelled = speed x time (s = vt)

(d) acceleration = change in velocity / time taken (a = (v - u)/t), oe **B1**

(d) Answer: acceleration = change in velocity / time taken (a = (v - u)/t)

(e) resultant force = mass x acceleration (F = ma), oe **B1**

(e) Answer: resultant force = mass x acceleration (F = ma)

Question 2

converts energy to joules: 252 kJ = 252 000 J **M1**

correct substitution: P = 252 000 / 120 **M1**

P = 2100 W, cao **A1**

Answer: 2100 W (2.1 kW)

Question 3

(a) converts frequency to hertz: 97.6 MHz = 9.76 x 10^7 Hz **M1**

(a) rearranges and substitutes: λ = v/f = (3.0 x 10^8)/(9.76 x 10^7) **M1**

(a) λ = 3.1 m (2 sf), awrt 3.1 **A1**

(a) Answer: 3.1 m (2 sf)

(b) converts frequency and substitutes: λ = (3.0 x 10^8)/(1.98 x 10^5) **M1**

(b) λ = awrt 1500 m (1.5 x 10^3 m), and correctly states the 198 kHz station has the longer wavelength **A1**

(b) Answer: approximately 1500 m (1.5 x 10^3 m); the 198 kHz station has the longer wavelength

Question 4

(a) h = GPE/(mg), oe **B1**

(a) Answer: h = GPE/(mg)

(b) R = V/I, oe **B1**

(b) Answer: R = V/I

(c) correctly isolates v^2: v^2 = 2 KE / m, oe **M1**

(c) $v = \sqrt{2\ KE / m}$, oe (the positive square root is the physical answer) **A1**

(c) Answer: $v = \sqrt{2\ KE / m}$

Question 5

converts area to m^2: 0.80 mm^2 = 8.0 x 10^{-7} m^2 **M1**

correct substitution: p = 12 / (8.0 x 10^{-7}) **M1**

p = 1.5 x 10^7 Pa, cao **A1**

Answer: 1.5 x 10^7 Pa

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