The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

PHYSICAL SETTING
PHYSICS

Thursday, June 15, 2017 — 1:15 to 4:15 p.m., only

ANSWER BOOKLET

Student ..... Key ..... ☐ Male

Sex: ☐ Female

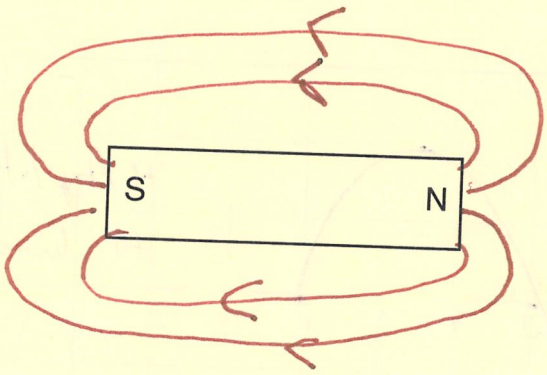
Teacher ..... Dr. Gasser .....

School ..... Grade .....

Record your answers for Part B–2 and Part C in this booklet.

Part B–2

51 4 Lines w/Arrows +1



Tritium = 1 proton + 2 neutrons
3 Quarks + 2(3 Quarks)

52 9 **quarks** +1

53 0 **e** +1

54 Strong Nuclear Force +1

+4

+2 same, No Accel in X-Dir

55 ~~20 x 10~~ 2d +1 $v = \frac{d}{t}$ $\frac{20\text{m}}{\text{s}} = \frac{d}{t}$ $d = 20\text{m/s}\,(t)$

56–57

Given

$I = .71\text{A}$

$v = 120\text{V}$

$t = ??$

$w = 3.0\times10^5\text{J}$

Eqn, sub w/units, Ans. w/units

$w = VIt$

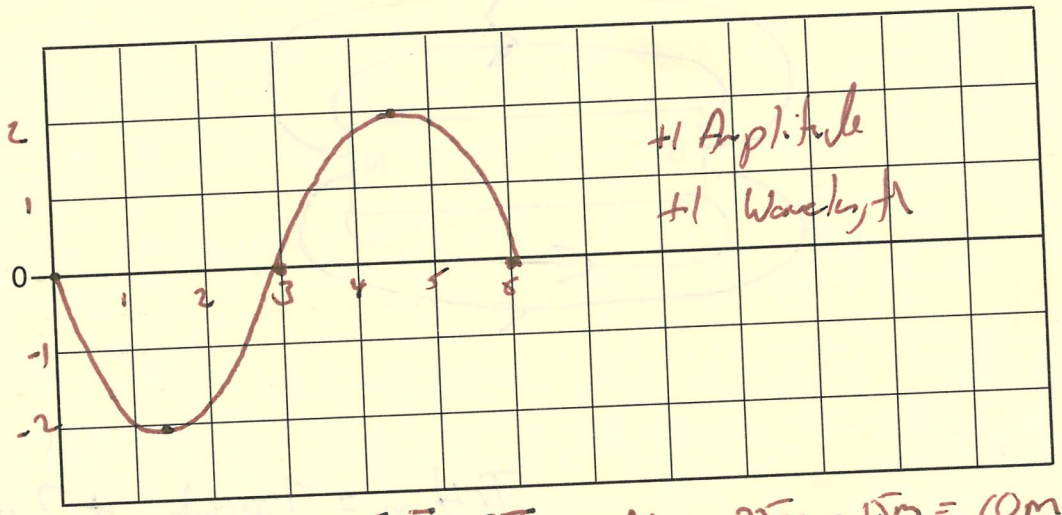
$3.0\times10^5 = 120\text{V}\,(.71\text{A})(t)$

$\frac{3.0\times10^5}{85.2} = \frac{85.2t}{85.2}$ +2

$t = 3521\text{s}$

58-59

+2



+1 Amplitude

+1 Wavelength

+1 60 350 N/m

$\Delta x = .25\text{m} - .15\text{m} = .10\text{m}$

$F = kx$

$35\text{N} = k(.10\text{m})$

+1 61 1.1×10^{-8} kg $E = mc^2$

+1 62 $1\text{GJ} = 1\times10^6\text{J}$ $1\times10^6\text{J} = m(3\times10^8\text{m/s})^2$

Lightning is seen w/ speed of light $(3\times10^8\text{m/s})$

Thnd heard by speed of sound $(3.31\times10^2\text{m/s})$

+2

63–64

Equation, Sub w/units
Ans. w/units

Given

$q = 28\,C$

$V = 3.2 \times 10^7\,V$

$t = 1.5 \times 10^{-3}\,s$

$I = ??$

$$I = \frac{q}{t}$$

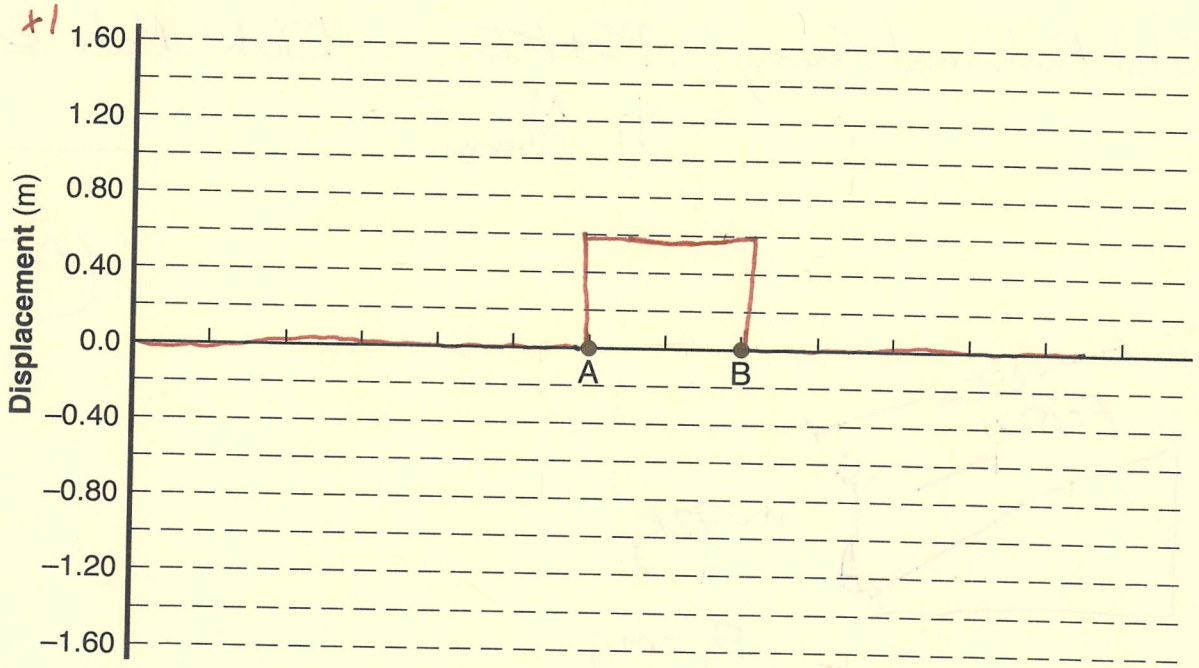
$$I = \frac{28\,C}{1.5 \times 10^{-3}\,s}$$

$$\boxed{I = 18{,}667\,A}$$

+2

65

+1



1.0m { ⎍ -.4m

1 - .4 = .6m

+3

Part C

66 36,340 J +1

$W = F \cdot d$
$= 158N\,(230m)$
$W = 36,340\,J$

67–68
Eqn, sub w/units Ans. w/units

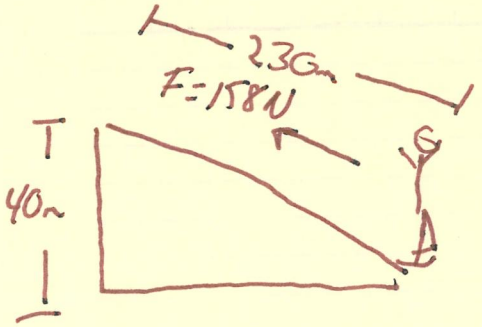
Given
$h = 40.0m$
$m = 72.0kg$
$g = 9.8 m/s^2$

$PE = mgh$
$= 72.0kg\,(9.8 m/s^2)\,(40.0m)$
$PE = 28,224\,J$ +2

+1 69 $W \neq PE$ ↑ Q

+1 70 Total Mechanical Energy = PE + KE ↑ Total Mech. Energy
↑ No Change

(+1)



$F_g = mg$
$72kg\,(9.8 m/s^2)$
$705.6N$

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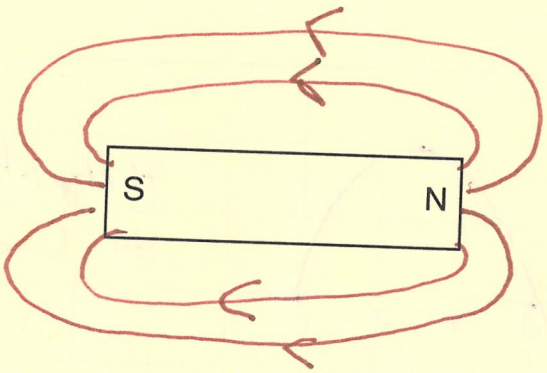

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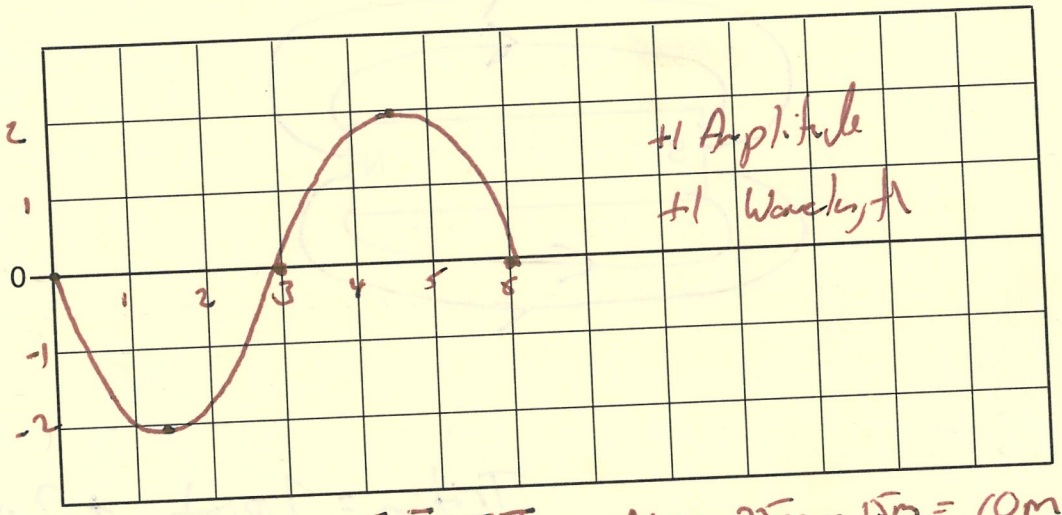

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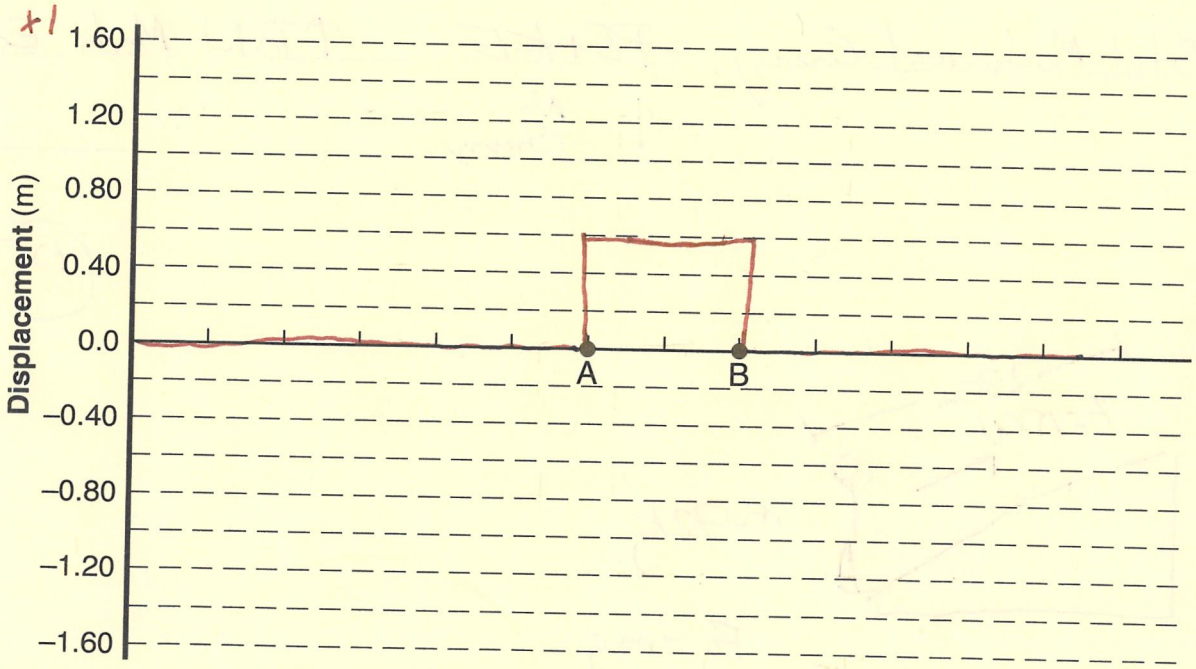
Eqn, sub w/units
Ans. w/units

+2

65

+1



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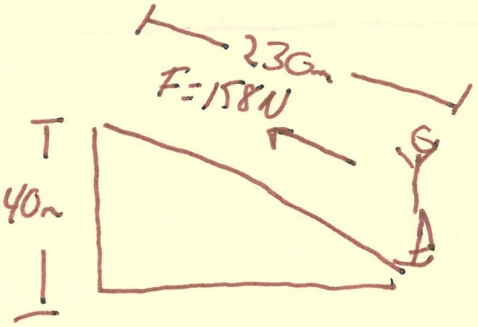

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$705.6N$

71–72 $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$

Eqn. Sub w/units, Ans. w/units

$\frac{1}{R_T} = \frac{1}{15\Omega} + \frac{1}{30\Omega}$

$\frac{1}{R_T} = 0.1$

x^{-1}

$\boxed{R_T = 10\Omega}$ +2

73 6A A

$R_T = \frac{V_T}{I_T}$ $10\Omega = \frac{60V}{I_T}$ Use R_T from 71/72 for credit

$\frac{10I}{10} = \frac{60}{10}$ $I = 6A$ +1

74–75 Rate of Energy = Rate of work = Power

Eqn, Sub w/units Ans w/units

$V = \frac{W}{Q}$

$P = VI$

$60V(6A)$

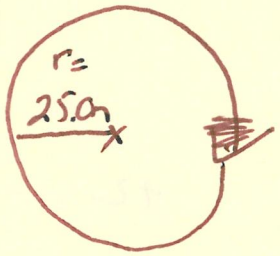
$360W$

Full credit if used I from 73 and is not 6A +2

76 No Change (V and R are Constant) +1

+6

77–78



$KE = \frac{1}{2}mv^2$

$= \frac{1}{2}(2.50kg)(18.0m/s)^2$

$KE = 405\ J$ +2

Givens

$m = 2.50kg$

$v = 18.0m/s$

$r = 25.0m$

Eq. Sub w/units, Ans. w/units

79–80

$F_c = \frac{mv^2}{r} = \frac{2.50kg(18.0m/s)^2}{25m} = \frac{810}{25}$

$F_c = 32.4N$

-or- +2

$a_c = \frac{v^2}{r} = \frac{(18.0m/s)^2}{25.0m} = \frac{324}{25} = 12.96m/s^2$

$F_c = ma_c$

$= 2.5kg(12.96m/s^2)$

$F_c = 32.4N$

+4

Eqn. Sub w/units
Ans. w/units

81–82

$v = f\lambda$

$$\frac{3.00\times10^{8}\ m/s}{5.09\times10^{14}\ Hz} = \frac{5.09\times10^{14}\ Hz\ \lambda}{5.09\times10^{14}\ Hz}$$

$\lambda = 5.89\times10^{-7}\ m$ +2

83 50° +1

84–85

Eqn, Sub w/units, Ans. w/units

Carry error from 83 to 84

$n_1 \sin\theta_1 = n_2 \sin\theta_2$

$n_1 \sin 50^{\circ} = 1.00 \sin 90^{\circ}$

$n_1(.7660) = 1.00(1.000)$

$$\frac{.7660\, n_1}{.7660} = \frac{1}{.7660}$$

$n_1 = 1.29$ +2

+5

P.S./PHYSICS