Task in physics for September:

s is your student number.

k = s mod 10000. T = s mod 100.

m35 = s mod 35. m25 = s mod 25. m20 = s mod 20.

m10 = s mod 10. m9 = s mod 9. m8 = s mod 8. m7 = s mod 7. m6 = s mod 6.

m5 = s mod 5. m4 = s mod 4. m3 = s mod 3. m2 = s mod 2.

Introduction:

1. What do you want from this course?

2. What is physics?

en.wikipedia.org/wiki/Physics

3. Why do you need physics?

4. Do what you like in physics.

Practical questions:

5. How can we reduce the pollution and its impact on people and nature?

6. Air purifier purifies 5 cubic meters of air. How many such air purifiers are needed for a room 5×5×10meters?

7. A dust particle with mass of 0.00001kg and speed of 5 m/s is subjected to a force of 0.00001N of the filter. How much time will it take to stop the particle?

8. How do we avoid moto-bike accidents?

9. How can we protect us from dangerous waves of explosions, tsunamis, etc.?

10. Do Bernoulli experiment.

11. Use the quantum computer.

https://www.research.ibm.com/ibm-q/

12. Will moving or static egg crack? Explain dynamic coefficient and attack vs. defence.

13. Explain efficiency of truck and trolley.

14. Do big or small wheals give more power.

15. Is black or white clothes warmer? Why?

16. Why does cat sit on its curved legs?

17. Why do cats stretch?

18. Analyse wars in Ukraine, Africa, Yemen, etc.

19. Study actions of operator of drone.

20. How can we help Indonesia using physics?

21. Use Chat GPT and/or other such methods.

22. Analyse physics news.

23. Apply for scholarships, grants, fellowships of USA, Europe, Canada, Australia, Japan, etc.

24. Apply for American citizenship:

https://www.dvlottery.state.gov/

Philosophical questions:

25. What is least constraint principle?

https://en.wikipedia.org/wiki/Gauss%27s\_principle\_of\_least\_constraint

26. How is physics used in computer science?

27. Study Zimmermann contests.

azspcs.com

28. What is quantum money?

29. Explain quantum teleportation.

https://en.wikipedia.org/wiki/Quantum\_teleportation

30. Suggest grand unification theory.

https://en.wikipedia.org/wiki/Grand\_Unified\_Theory

Choose the most likely Grand Unified Theory. Explain.

Project:

31. Do your project.

General questions:

32. Study

https://physics15.weebly.com/

https://physics16.weebly.com/

https://physics18.weebly.com/

33. Study general concepts of mechanics, oscillation, fluid mechanics, thermodynamics, optics, electromagnetism, quantum physics and cosmology.

https://en.wikipedia.org/wiki/Mechanics

https://en.wikipedia.org/wiki/Oscillation

https://en.wikipedia.org/wiki/Fluid\_mechanics

https://en.wikipedia.org/wiki/Thermodynamics

https://en.wikipedia.org/wiki/Optics

https://en.wikipedia.org/wiki/Electromagnetism

https://en.wikipedia.org/wiki/Quantum\_mechanics

https://en.wikipedia.org/wiki/Cosmology

34. What is psychophysics?

en.wikipedia.org/wiki/Psychophysics

35. What is econophysics?

https://en.wikipedia.org/wiki/Econophysics

36. What is fractal?

https://en.wikipedia.org/wiki/Fractal

37. What it Schrodinger cat?

38. Show that ta has units of v.

39. How do we travel in time?

https://edition.cnn.com/travel/article/time-travel-ron-mallett-scn/index.html

40. Explain Heisenberg Uncertainty Principle.

41. Explain musical instruments.

42. Explain extraterrestrial life.

https://en.wikipedia.org/wiki/Extraterrestrial\_life

43. What is Compton Effect?

https://en.wikipedia.org/wiki/Compton\_scattering

44. Explain Hole Effect.

https://en.wikipedia.org/wiki/Hall\_effect

45. Explain the Dark Matter.

46. What is Dark Energy?

47. Is the density of our Universe smaller, the same or larger than the critical density?

48. Explain Bose-Einstein Condensate.

49. Solve number puzzle for 3 + m8 digits.

https://discrete4math.weebly.com/uploads/2/5/3/9/25393482/codesums0-9.txt

https://discrete4math.weebly.com/uploads/2/5/3/9/25393482/code1-9sums.txt

https://discrete4math.weebly.com/uploads/2/5/3/9/25393482/1-8code1-8sums.txt

https://discrete4math.weebly.com/uploads/2/5/3/9/25393482/0-6codesums.txt

https://discrete4math.weebly.com/uploads/2/5/3/9/25393482/1dx4de5dnumberpuzzle.txt

https://discrete4math.weebly.com/uploads/2/5/3/9/25393482/2dx3de5dnumberpuzzle.txt

https://discrete4math.weebly.com/uploads/2/5/3/9/25393482/code1-9numberpuzzles.txt

https://discrete4math.weebly.com/uploads/2/5/3/9/25393482/code0-8numberpuzzles.txt

https://discrete4math.weebly.com/uploads/2/5/3/9/25393482/code1-8numberpuzzles.txt

https://discrete4math.weebly.com/uploads/2/5/3/9/25393482/code0-6numberpuzzles.txt

https://discrete4math.weebly.com/uploads/2/5/3/9/25393482/code1-6numberpuzzles.txt

https://discrete4math.weebly.com/uploads/2/5/3/9/25393482/code1-5numberpuzzles.txt

https://discrete4math.weebly.com/uploads/2/5/3/9/25393482/code1-4numberpuzzles.txt

50. Hack password.

https://calculus1only.weebly.com/

https://calculus1only.weebly.com/uploads/5/9/8/5/59854633/password-hacking-game-rules.docx

https://calculus1only.weebly.com/uploads/5/9/8/5/59854633/guessinput.txt

51. How do we help Indonesia?

Units:

52. What are the base units?

53. Explain units of physics.

Measures:

54. Explain measures.

Significant figures:

55. Explain significant figures.

56. How many significant figures are there in your T number?

57. Give the number of significant figures of the number for your T.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1: 8778000 | 2: 0.000567 | 3: 80600 | 4: 0.00067900 | 5: 346000 |
| 6: 0.000673 | 7: 95328000 | 8: 943258000 | 9: 0.000774 | 10: 9900 |
| 11: 987890 | 12: 0.0000561 | 13: 94034600 | 14: 900653540 | 15: 0.005469 |
| 16: 4365600 | 17: 0.003268 | 18: 456700 | 19: 467000 | 20: 0.0000676 |
| 21: 36.00800 | 22: 65.00 | 23: 0.00000 | 24: 7890000 | 25: 0.0003 |
| 26: 65765700 | 27: 0.000500 | 28: 56456000 | 29: 0.00056 | 30: 6756700 |
| 31: 674670 | 32: 0.00654 | 33: 434500 | 34: 0.020450 | 35: 8760076 |
| 36: 0.0065400 | 37: 5689400 | 38: 0.000600 | 39: 5930300 | 40: 0.007700 |
| 41: 4920010 | 42: 4090330 | 43: 0.0750000 | 44: 490304457 | 45: 0.0060700 |
| 46: 4790650 | 47: 0.0006277 | 48: 50403460 | 49: 0.0060600 | 50: 490400600 |
| 51: 000000 | 52: 589500 | 53: 96400800 | 54: 0.0045045 | 55: 358000500 |
| 56: 0.00143 | 57: 32122000 | 58: 1258000 | 59: 0.001474 | 60: 51200 |
| 61: 187890 | 62: 0.000021 | 63: 94034100 | 64: 200653540 | 65: 0.005419 |
| 66: 4362600 | 67: 0.003268 | 68: 412700 | 69: 427000 | 70: 0.0000671 |
| 71: 174170 | 72: 0.00214 | 73: 434300 | 74: 0.020410 | 75: 8230021 |
| 76: 0.0012400 | 77: 2189400 | 78: 0.000200 | 79: 1930300 | 80: 0.003200 |
| 81: 1920010 | 82: 4020330 | 83: 0.0120000 | 84: 490304432 | 85: 0.0060300 |
| 86: 000000 | 87: 589100 | 88: 92400800 | 89: 0.0041045 | 90: 358000200 |

Accuracy and precision:

58. Explain the example of:

m4 = 0: accurate and precise.

m4 = 1: accurate and NOT precise.

m4 = 2: NOT accurate and precise.

m4 = 3: NOT accurate and NOT precise.

Errors:

59. Calculate the compound errors for x = s, dx = 1/T; y = T, dy = 1/k.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/compound\_errors.txt

60. Explain absolute and relative error.

61. What is solid mechanics?

https://en.wikipedia.org/wiki/Solid\_mechanics

62. Give mechanics conservation laws.

https://en.wikipedia.org/wiki/Conservation\_law

63. Explain physics of quantum cryptography and public key cryptography.

64. What is chaos?

https://en.wikipedia.org/wiki/Chaos\_theory

Mechanics:

Kinematics:

65. Find velocity and acceleration for one-dimensional motion with the equation x = -k + Lt + Tt2.

66. Find angular velocity and linear acceleration for v = T m/s and R = k meters.

s = 19107012

L = s Mod 10

T = s Mod 100

k = s Mod 10000

v = T

R = k

omega = v / R

a = R \* omega ^ 2

MsgBox omega

MsgBox a

https://physics16.weebly.com/uploads/5/9/8/5/59854633/angular\_velocity\_linear\_acceleration2019nov.txt

67. Find velocity and acceleration at T degrees latitude. Earth Radius = 6371.009km.

s = 19107016

T = s Mod 100

RE = 6371.009

Pi = 4 \* Atn(1)

omegaE = 2 \* Pi / 24

Angle = T \* Pi / 180

R = RE \* Cos(Angle)

v = R \* omegaE

a = R \* omegaE ^ 2

MsgBox v

MsgBox a

https://physics16.weebly.com/uploads/5/9/8/5/59854633/latitude4velocity4acceleration2019nov.txt

68. Find the angular speed and total acceleration for the rotational motion of the material point around the circumference with radius of T meters and constant linear speed of s meters per second.

https://physics16.weebly.com/uploads/5/9/8/5/59854633/omega\_acceleration309task2019.txt

69. What is partial derivative of kinetic energy $\frac{mv^{2}}{2}$ with respect to v?

70. Can material point be translated?

71. Can material point be rotated?

Rotation:

72. Explain

m6 = 0: angle

m6 = 1: angular velocity

m6 = 2: angular frequency

m6 = 3: angular acceleration

m6 = 4: moment of inertia

m6 = 5: moment of force

73. Compare translation and rotation.

Angular momentum conservation:

74. Explain angular momentum conservation (gyro, Foucault pendulum).

75. Find potential energy E = mgh. h = T.

https://en.wikipedia.org/wiki/Potential\_energy

s = 19107012

m = s Mod 35

T = s Mod 100

g = 10

h = T

E = m \* g \* h

MsgBox E

76. Give kinetic energy $E= \frac{mv^{2}}{2}$. v = T.

https://en.wikipedia.org/wiki/Kinetic\_energy

s = 19107012

m = s Mod 35

T = s Mod 100

v = T

E = m \* v ^ 2 / 2

MsgBox E

77. Calculate the final speed after absolutely inelastic collision of two balls of masses L kg and T kg, moving with velocities s m/s and k m/s respectively.

 http://physics16.weebly.com/uploads/5/9/8/5/59854633/inelastic4collision.txt

78. Solve the elastic collision problem for u1 = k, u2 = k/2, m1 = k, m2 = 2k.

 http://physics16.weebly.com/uploads/5/9/8/5/59854633/linear2elastic4collision.txt

79. Find the acceleration of a simple pulley for two masses: L kg and T kg.

 http://physics16.weebly.com/uploads/5/9/8/5/59854633/problem4pulleys.txt

Statics:

80. Find the center of mass of k equal masses k meters apart located on a straight line.

 http://physics16.weebly.com/uploads/5/9/8/5/59854633/center\_of\_mass\_of\_k\_masses.txt

81. Find the hangover for the s blocks in the blocks stacking problem.

 http://physics16.weebly.com/uploads/5/9/8/5/59854633/hangover.txt

82. Explain tensor of inertia for drone, etc.

Dynamics:

83. Is big or small foot better for more accurate and precise kick at soccer ball?

Is Ronaldo or Messi better for that?

84. Explain mv = Ft.

Forces:

85. Find acceleration of a mass at the inclined plane with

 A = T degrees and the friction coefficient μ = 1/T.

https://physics16.weebly.com/uploads/5/9/8/5/59854633/ramp4inclined4plane2019oct.txt

http://physics16.weebly.com/uploads/5/9/8/5/59854633/inclined4plane.txt

86. What is friction?

87. Calculate friction force F = μN. μ = 1/T. N = k.

https://en.wikipedia.org/wiki/Friction

s = 19107012

T = s mod 100

K = s mod 10000

mu=1/T

N=k

F=mu\*N

MsgBox F

88. What is your weight?

89. Find F = ma, M = Jε, for m = a = J = ε = T.

90. Find gravity acceleration g, orbital velocity Vo and escape velocity Ve for planet with mass s billion tons and radius s millimetres.

https://physics18.weebly.com/uploads/5/9/8/5/59854633/g1orbital1velocity1escape1velocity13oct2017.txt

Projectile:

91. Find x and y for projectile with x0 = y0 = 0, v0 = T m/s, t = T seconds, A = T degrees.

Find maximum distance and maximum height.

https://physics16.weebly.com/uploads/5/9/8/5/59854633/projectile309task2019.txt

92. Analyse projective motion of V0 = T m/s, A = T degrees.

93. Solve the linear and non-linear real projectile problems for A = T degrees, V = T, R = 1/T.

Linear:

Going up:

x'' + Rx' = 0

y'' + Ry' = -g

Going down:

x'' + Rx' = 0

y'' - Ry' = -g

https://www.grc.nasa.gov/www/k-12/airplane/flteqs.html

http://farside.ph.utexas.edu/teaching/336k/Newtonhtml/node29.html

Non-linear:

Going up:

x'' + R(x')2 = 0

y'' + R(y')2 = -g

Going down:

x'' + R(x')2 = 0

y'' - R(y')2 = -g

g = 10

x(t)

y(t)

t = time

R = Drag

x(0) = 0

x'(0) = Vcos(A)

y(0) = 0

y'(0) = Vsin(A)

Check if Vsin(A) > 1/T. Explain.

How can you assess the solution for drag R if you have solution for case R = 0?

http://www.wolframalpha.com/widgets/view.jsp?id=e602dcdecb1843943960b5197efd3f2a

https://www.emathhelp.net/calculators/differential-equations/differential-equation-calculator/?i=y%27%27%2B+0.01\*y%27%3D-10%2C+y%280%29%3D0%2C+y%27%280%29%3D1

Vectors and tensors:

94. Add, subtract and multiply the vectors (T,k) and (L,s).

s = 19107012

L = s Mod 10

T = s Mod 100

k = s Mod 10000

sum1 = T + L

sum2 = k + s

MsgBox sum1

MsgBox sum2

difference1 = T - L

difference2 = k - s

MsgBox difference1

MsgBox difference2

dotproduct = T \* L + k \* s

MsgBox dotproduct

crossproduct = T \* s - k \* L

MsgBox crossproduct

https://physics16.weebly.com/uploads/5/9/8/5/59854633/arithmetic4vectors2019nov.txt

95. Find dot-product of tensor and vector $\left[\begin{matrix}L&T\\a&m\end{matrix}\right]\left(\genfrac{}{}{0pt}{}{e}{q}\right)$

a = m25

e = m8

L = m10

m = m35

q = m17

T = m100

Dim t(2, 2), v(2), r(2)

s = 19107016

a = s Mod 25

e = s Mod 8

L = s Mod 10

m = s Mod 35

q = s Mod 17

tt = s Mod 100

t(1, 1) = L

t(1, 2) = tt

t(2, 1) = a

t(2, 2) = m

v(1) = e

v(2) = q

r(1) = t(1, 1) \* v(1) + t(1, 2) \* v(2)

r(2) = t(2, 1) \* v(1) + t(2, 2) \* v(2)

MsgBox r(1)

MsgBox r(2)

https://calculus17.weebly.com/uploads/7/7/9/0/77906190/tensor\_times\_vector2019nov.txt

Oscillation:

Forced vibration with damping:

96. Ty'' + my' + Ly = sin(Tx)

Is there resonance?

m = m35

L = m10

http://www.wolframalpha.com/widgets/view.jsp?id=e602dcdecb1843943960b5197efd3f2a

97. Ty'' + Ly = sin(ωx)

Find resonant ω.

s = 19107012

L = s Mod 10

T = s Mod 100

omega = Sqr(L / T)

MsgBox omega

https://physics16.weebly.com/uploads/5/9/8/5/59854633/resonant4frequency2019nov.txt

98. Give period of spring oscillator $T=2π\sqrt{\frac{m}{k}}$. m = m35. k = m10000.

s = 19107012

m = s Mod 35

k = s Mod 10000

Pi = 4 \* Atn(1)

T = 2 \* Pi \* Sqr(m / k)

MsgBox T

https://physics16.weebly.com/uploads/5/9/8/5/59854633/spring4oscillator2019nov.txt

99. Find period of pendulum $T=2π\sqrt{\frac{L}{g}}$. L = m10.

s = 19107012

L = s Mod 10

g = 10

Pi = 4 \* Atn(1)

T = 2 \* Pi \* Sqr(L / g)

MsgBox T

https://physics16.weebly.com/uploads/5/9/8/5/59854633/pendulum4period2019nov.txt

100. Solve oscillation problem y'' + yT2 = 0.

https://www.wolframalpha.com/input/?i=y%27%27+%2B+16y+%3D+0

101. Find the displacement of a harmonic oscillator after s seconds with amplitude k, frequency k and initial phase k/2.

 http://physics16.weebly.com/uploads/5/9/8/5/59854633/harmonic4oscillator.txt

102. Solve the string oscillatory equation for v = T, frequency = L = m10, Amplitude = T.

 Find the displacement after s seconds at m meters.

https://physics18.weebly.com/uploads/5/9/8/5/59854633/string1wave1oscillation22oct2017.txt

103. Give interference equation for sin(ω(t – x/v)) and sin(L + ω(t – x/v)). L = m10.

s = 19107012

L = s Mod 10

T = s Mod 100

k = s Mod 10000

omega = T

x = k

v = s

A1 = omega \* (T - x / v)

A2 = L + omega \* (T - x / v)

oscillatingvalue = 2 \* Sin((A1 + A2) / 2) \* Cos((A1 - A2) / 2)

MsgBox oscillatingvalue

https://physics16.weebly.com/uploads/5/9/8/5/59854633/interference2019nov.txt

Fluids:

104. Prove fluid pressure equation p = ρgh.

105. Calculate fluid pressure p = ρgh. ρ = a; h = T.

https://en.wikipedia.org/wiki/Pressure#Fluid\_pressure

s = 19107012

a = s Mod 25

T = s Mod 100

ro = a

g = 10

h = T

p = ro \* g \* h

MsgBox p

106. How will water level change if all floating icebergs will melt?

107. What is Bernoulli principle?

https://en.wikipedia.org/wiki/Bernoulli%27s\_principle

108. Explain Magnus effect.

https://en.wikipedia.org/wiki/Magnus\_effect

Gas:

109. Find real gas pressure.

https://en.wikipedia.org/wiki/Real\_gas

$$p=\frac{RT}{V\_{m}-b}-\frac{a}{V\_{m}^{2}}$$

a = m25

b = m9

Vm = s

R = m8

T = m100

s = 19107012

m25 = s Mod 25

m9 = s Mod 9

m8 = s Mod 8

m100 = s Mod 100

a = m25

b = m9

Vm = s

R = m8

T = m100

p = R \* T / (Vm - b) - a / Vm ^ 2

MsgBox p

Thermodynamics:

110. The thermal expansion rate α is 1/k. The temperature change is T degrees.

 a. Find the extension of m meters rod due to the temperature change.

 b. Find the approximate volume change of m meters cubed cube due to the temperature change.

 http://physics16.weebly.com/uploads/5/9/8/5/59854633/thermal4expansion.txt

111. There are two bodies in a thermodynamically isolated system: C1 m1 T1 and C2 m2 T2. Find the resulting temperature T. m1 = k, m2 = 2k. C1 = k/11, C2 = k/222, T1 = k/111, T2 = k/22

http://physics16.weebly.com/uploads/5/9/8/5/59854633/result4temperature.txt

112. What happens if the temperature = 0K?

113. Give thermodynamics laws.

m3 = 0: 0 thermodynamics law.

m3 = 1: 1 thermodynamics law.

m3 = 2: 2 thermodynamics law.

114. Thermodynamics:

m4 = 0: Write Ideal Gas equation.

m4 = 1: Give isothermal process equation.

m4 = 2: Give isobaric process equation.

m4 = 3: Give isochoric process equation.

115. Thermodynamics:

m4 = 0: Explain Heat Engine.

m4 = 1: What is thermodynamics of air-conditioning?

m4 = 2: Give thermodynamics laws.

m4 = 3: Explain real gas.

116. Give P from PV = nRT. R = 2 + m25. V = 3 + m35. n = s.

https://en.wikipedia.org/wiki/Ideal\_gas\_law

s = 19107012

L = s Mod 10

m = s Mod 35

T = s Mod 100

k = s Mod 10000

E = s Mod 8

q = s Mod 17

R = s Mod 25

d = 2 + (T - L) / 10

Pi = 4 \* Atn(1)

R = R + 2

V = 3 + m

n = s

P = n \* R \* T / V

MsgBox P

Waves in general:

117. Find the wavelength for v = k m/s and f = T Hz.

s = 19107012

L = s Mod 10

T = s Mod 100

k = s Mod 10000

v = k

f = T

Lambda = v / f

MsgBox Lambda

https://physics16.weebly.com/uploads/5/9/8/5/59854633/wavelength\_through\_v\_and\_frequency2019nov.txt

Electromagnetism:

118. Explain

m3 = 0: resistor

m3 = 1: capacitor

m3 = 2: inductor

119. Explain

m2 = 0: semiconductor

m2 = 1: p-n junction.

https://en.wikipedia.org/wiki/P%E2%80%93n\_junction

120. Explain

m2 = 0: diode

m2 = 1: transistor

121. Explain.

m3 = 0: Ohm law.

m3 = 1: First Kirchhoff law

m3 = 2: Second Kirchhoff law

122. Give NOT, AND, OR gates circuits using transistor.

m3 = 0: NOT

m3 = 1: AND

m3 = 2: OR

Oscillation in electromagnetism:

123. Find the frequency and the period of the harmonic oscillator. L = k μH and C = T μF.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/rlc4circuit4natural4frequency4period.txt

Waves in electromagnetism:

124. Explain the similarities and the differences of mechanical and electromagnetic waves.

125. T Watts lamp emits electromagnetic radiation in all directions. Assuming a lamp to be a point source, calculate the intensity of the radiation:

a. at distance of 1 m from the lamp.

b. at distance of 2 m from the lamp.

S = 4πR2.

I = T/S.

s = 19107012

L = s Mod 10

T = s Mod 100

k = s Mod 10000

Pi = 4 \* Atn(1)

S1 = 4 \* Pi \* 1 ^ 2

S2 = 4 \* Pi \* 2 ^ 2

I1 = T / S1

I2 = T / S2

MsgBox I1

MsgBox I2

https://physics16.weebly.com/uploads/5/9/8/5/59854633/intensity4radius2019nov.txt

126. Waves from a source have an amplitude of 5 cm and an intensity of T Wm-2.

a. The amplitude of the waves is increased to 10 cm. What is their intensity now?

b. The intensity of the waves is increased to 100 Wm-2. What is their amplitude?

I = CA2.

C = I/A2.

I = Intensity

A = Amplitude

C = Constant

s = 19107012

L = s Mod 10

T = s Mod 100

k = s Mod 10000

I = T

A = 5 \* 10 ^ (-2)

C = I / A ^ 2

A = 10 \* 10 ^ (-2)

I = C \* A ^ 2

MsgBox I

I = 100

A = Sqr(I / C)

MsgBox A

https://physics16.weebly.com/uploads/5/9/8/5/59854633/amplitude4intensity2019nov.txt

127. Light of wavelength T nm in a vacuum travels into glass, where its speed decreases to 2×108ms-1. Determine:

a. the frequency of the light in vacuum

b. its frequency and wavelength in glass.

c = 3\*108 m/s in vacuum.

s = 19107012

L = s Mod 10

T = s Mod 100

k = s Mod 10000

c = 3 \* 10 ^ 8

lambdainvacuum = T \* 10 ^ (-9)

frequencyinvacuum = c / lambdainvacuum

MsgBox frequencyinvacuum

velocityinglass = 2 \* 10 ^ 8

lambdainglass = velocityinglass / frequencyinvacuum

MsgBox lambdainglass

https://physics16.weebly.com/uploads/5/9/8/5/59854633/wavelength4frequency4refraction2019nov.txt

128. An astronomer observes light from a distant star. A particular line in its spectrum has a wavelength of T nm. When measures in the laboratory, the same spectral line has a wavelength of L nm. Determine:

a. the change in the wavelength of the spectral line

b. the speed of the star

c. the direction of the movement of the star (towards or away from the observer).

f = c/T

F = c/L

f = Fc/(c+v)

v = -c + Fc/f

s = 19107012

L = s Mod 10

T = s Mod 100

k = s Mod 10000

c = 3 \* 10 ^ 8

f\_small = c / (T \* 10 ^ (-9))

F\_BIG = c / (L \* 10 ^ (-9))

wavelebgthchange = T \* 10 ^ (-9) - L \* 10 ^ (-9)

MsgBox wavelebgthchange

v = -c + c \* F\_BIG / f\_small

MsgBox v

https://physics16.weebly.com/uploads/5/9/8/5/59854633/doppler4effect2019nov.txt

Resistance:

129. Find $R=\frac{ρL}{A}. $ A = m25. ρ = m17. L = m10.

s = 19107012

L = s Mod 10

ro = s Mod 17

A = s Mod 25

R = L \* ro / A

MsgBox R

https://physics16.weebly.com/uploads/5/9/8/5/59854633/resistivity2019nov.txt

130. Ed = V (uniform field strength (electric field)). E = m8. d = d2.

s = 19107012

L = s Mod 10

T = s Mod 100

k = s Mod 10000

E = s Mod 8

d = (T - L) / 10

V = E \* d

MsgBox V

https://physics16.weebly.com/uploads/5/9/8/5/59854633/uniform4electromagnetic4field2019nov.txt

131. F = Eq (field and force (electricity)). E = m8. q = m17.

s = 19107012

L = s Mod 10

T = s Mod 100

k = s Mod 10000

E = s Mod 8

q = s Mod 17

F = E \* q

MsgBox F

https://physics16.weebly.com/uploads/5/9/8/5/59854633/force4electromagnetic4field2019nov.txt

132. Find x. λD = ax Young double-slit experiment (waves). D = d2. a = m25. λ = L = m10.

s = 19107012

L = s Mod 10

T = s Mod 100

k = s Mod 10000

E = s Mod 8

q = s Mod 17

a = s Mod 25

d = (T - L) / 10

Lambda = L

x = Lambda \* d / a

MsgBox x

https://physics16.weebly.com/uploads/5/9/8/5/59854633/young4double4slit4experiment2019nov.txt

133. Give n. d sinA = nλ diffraction grating (waves). d = d2. A = m25. λ = L = m10.

s = 19107012

L = s Mod 10

T = s Mod 100

k = s Mod 10000

E = s Mod 8

q = s Mod 17

A = s Mod 25

d = (T - L) / 10

Pi = 4 \* Atn(1)

A = A \* Pi / 180

Lambda = L

n = d \* Sin(A) / Lambda

n = Round(n)

MsgBox n

https://physics16.weebly.com/uploads/5/9/8/5/59854633/diffraction4grating2019nov.txt

134. Show that Maximum loss in circuit with internal resistance r and external resistance R is when R = r.

E = I(R+r)

waste = RI2.

-

135. Optics:

m5 = 0: Explain plane mirror.

m5 = 1: Explain convex mirror.

m5 = 2: Explain concave mirror.

m5 = 3: Explain converging lens.

m5 = 4: Explain diverging lens.

136. Maxwell equations:

m2 = 0: Explain Maxwell equations.

m2 = 1: Give the solution to the simplified Maxwell equations.

137. Scattering:

m3 = 0: What color is the Sun?

m3 = 1: Why are clouds white?

m3 = 2: Why is the sky blue?

138. Find the force between two charges of L and T Coulombs, m meters apart.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/coulomb\_force.txt

139. Solve the simplified Maxwell Equations for c = 300000000-s, red light. Take amplitude 1 V/m. Find the intensity of electric field after s seconds at m meters.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/maxwell\_equations\_solution.txt

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140. Suppose a star has a surface temperature of 4k degrees. What are the wavelength and the color this star appears?

http://physics16.weebly.com/uploads/5/9/8/5/59854633/color4black4body.txt

141. Find V1 for the transformer if V2 = T volts, N1 = k and N2 = s.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/transformer.txt

142. T kilowatts of electric power is sent to a town from a power plant. The transmission lines have the total resistance of 0.1T Ohms. Calculate the power loss if the power is transmitted at:

(a) 0.03k Volts (b) s Volts

http://physics16.weebly.com/uploads/5/9/8/5/59854633/losses4transmitting4power.txt

143. A circular coil of wire has a diameter of 0.002k cm and contains 10 loops. The current in each loop is 3A, and the coil is placed into 2TESLA external magnetic field. Determine the maximum and minimum torque exerted on the coil by the field.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/torque.txt

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144. Calculate the series and the parallel circuits with e.m.f. of T Volts and the resistors L+1, 2 and 3 ohms respectively.

http://physics18.weebly.com/uploads/5/9/8/5/59854633/series\_parallel\_circuits.txt

145. Find the electrical current i in the circuit for R = T, L = 1/k, C = 1/s, ω = k, and εm = T.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/2054\_ch21a.pdf

146. A man 0.25k mm tall stands in front of a vertical plane mirror. His eyes are 10 cm bellow the top of his head. What are the sizes and the best location of the smallest possible mirror so that he can see his entire body?

http://physics16.weebly.com/uploads/5/9/8/5/59854633/height4mirror.txt

147. For convex mirror with a radius of curvature of 0.002k meters, determine the location of the image and its magnification for an object 0.0012k meters from the mirror.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/mirror.txt

148. A spy satellite camera can recognize T cm objects from the altitude of n meters. If diffraction was the only limitation (the wave length Lambda = 0.1k nanometers), determine what diameter lens the camera has.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/satellite4spying.txt

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149. Give color m7 in ROYGBIV visible colors.

https://en.wikipedia.org/wiki/ROYGBIV

s = 19107012

m7 = s Mod 7

If m7 = 0 Then MsgBox "R"

If m7 = 1 Then MsgBox "O"

If m7 = 2 Then MsgBox "Y"

If m7 = 3 Then MsgBox "G"

If m7 = 4 Then MsgBox "B"

If m7 = 5 Then MsgBox "I"

If m7 = 6 Then MsgBox "V"

150. Analyze light.

m2 = 0: What is the most frequent visible light?

m2 = 1: What color is military uniform?

Medium value is the most likely.

Gravity:

151. Calculate the Schwarzschild radius for the k grams desk.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/radius4schwarzschild.txt

Atom:

152. Estimate the distances between the atoms of element number T in the periodic table of elements.

https://physics16.weebly.com/uploads/5/9/8/5/59854633/distance\_between\_particles\_for\_many\_atoms2019oct.txt

http://physics16.weebly.com/uploads/5/9/8/5/59854633/distance\_between\_particles.txt

Particles:

153. Find energy and momentum of photon of s Hz frequency.

154. Calculate the energy and momentum of a photon for Lambda = 0.05k nanometers.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/energy4photon.txt

155. Determine the wavelength of an electron that has been accelerated through the potential difference of T Volts.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/wavelength4electron.txt

156. Calculate the wavelength of k grams desk moving T centimeters per second.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/waves4matter.txt

157. What is the matter wave length of T gram book?

158. Find the energy level and angular momentum for hydrogen according to the Bohr Model.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/bohr.txt

159. Are massless or mass-full particles used in quantum information? Why?

160. Perform correlation and regression analyses of the periodic table for T+2 elements and for m7 + 3 elementary particles.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/correlations4periodic4table.xlsx

http://physics16.weebly.com/uploads/5/9/8/5/59854633/regression4periodic4table.txt

http://physics16.weebly.com/uploads/5/9/8/5/59854633/evergy4lifetime.xlsx

http://physics16.weebly.com/uploads/5/9/8/5/59854633/regression4elementary4particles4energies4life4times.txt

161. What particles mediate electromagnetic interaction?

A. electrons

B. protons

C. positrons

D. photons

162. What particles mediate strong interaction?

A. neutrons

B. gluons

C. photons

D. protons

163. Find the energy of the photon with the frequency of s Hz.

E2 = (mc2)2 + (pc)2.

-

164. Give the structure of neutron.

165. Give the structure of proton.

Use quarks.

E = mc^2

166. Find the annihilation energy of k grams of matter.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/energy4binding.txt

Relativity:

167. If your velocity would be $v=\left(1-\frac{1}{e+2}\right)c$ then how would your height, mass, and time change?

e = m8.

Assess how velocity affects height and mass.

s = 19107012

e = s Mod 8

c = 10 ^ 8

v = c \* (1 - 1 / (e + 2))

factor = Sqr(1 - v ^ 2 / c ^ 2)

inversefactor = 1 / factor

MsgBox factor

MsgBox inversefactor

https://physics16.weebly.com/uploads/5/9/8/5/59854633/special\_relativity\_change\_time\_mass\_height2019oct.txt

Decay:

168. Calculate the remaining mass (it is NOT 0) of the decaying substance after k seconds if the decay ratio is T and initial mass is s. Calculate the half-life.

http://physics16.weebly.com/uploads/5/9/8/5/59854633/code4nuclear4decay4half4life.txt

Fundamental Physical interactions:

169. How many times is Electromagnetic Force weaker than the Strong Force?

A. 137

B. 758

C. 3592

D. 126434

Additional questions:

Practical:

170. How dangerous it is to live near high voltage electric wires?

171. How can we avoid ingrowing nails?

172. Analyse jokes.

Philosophical:

173. Can I prove anything?

174. What are the best countries?

Fluid:

175. Explain Archimedes principle Fb = - ρgV

Quantum computer:

176. Use quantum computer.

quantum-computing.ibm.com

Projectile:

177. Find Maximum x, Maximum y, x, y at time = T seconds, angle of release A = T degrees, initial velocity V0 = T meters per second, x0 = y0 = 0.

s = 19107016

T = s Mod 100

v0 = T

g = 10

Pi = 4 \* Atn(1)

A = T \* Pi / 180

x0 = 0

y0 = 0

x = x0 + T \* v0 \* Cos(A)

y = y0 + T \* v0 \* Sin(A) - g \* T / 2

MsgBox x

MsgBox y

xmax = v0 ^ 2 \* Sin(2 \* A) / g

ymax = v0 ^ 2 \* (Sin(A)) ^ 2 / (2 \* g)

MsgBox xmax

MsgBox ymax

physics16.weebly.com/uploads/5/9/8/5/59854633/projectile309task2019.txt