

applied analytics

by Mihai-Adrian Peleski

Submission date: 11-Jan-2025 09:43AM (UTC+0000)

Submission ID: 248021701

File name: 52984_Mihai-Adrian_Peleski_applied_analytics_633625_201738629.pptx (790.56K)

Word count: 38

Character count: 124

MODULE CODE: ACMA 4009

APPLIED ANALYTICS

STUDENT

PELESKI MIHAJ

STUDENT ID: 2323340

1.

a) Temperature: the base unit is Kelvin (K)

b) - This measures how bright something is
the base unit is Candela (cd)

c) - The amount of space something takes up
the base unit here is Cubic Meter (m^3)

d) - This is about measuring distance in a straight line
The base unit is the Meter (m)

e) The base unit is Second (s)

2) Pressure is the amount of force applied over a certain area

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$$

Force = Newtons (N)

$$\text{Force} = \text{Mass (m)} \times \text{Acceleration} = (\text{kg}) \times (\text{m/s}^2)$$

Area = square meter (m^2)

$$\text{Pressure} = \frac{N}{m^2} = \frac{1 \text{ kg} \cdot 1 \text{ m/s}^2}{1 \text{ m} \times 1 \text{ m}}$$

3) a) ? $W = 2 \times 9.8 = 19.6 \text{ N}$
normal reaction (R) is the support force
frictional force (F) is keeping the body from sliding

b) maximum frictional force (F_{max}) $F_{\text{max}} = \mu R$

in limiting equilibrium, the frictional force is equal to the component of the weight parallel to the incline (W_x)

~~$$F = W_x = W \sin(45^\circ)$$~~

$$W_x = W \sin(45^\circ) \quad W_x = 19.6 \times \frac{1}{\sqrt{2}} \approx 13.86 \text{ N}$$

c) Are equal forces (R)
the normal reaction is equal to the perpendicular component of the weight (W_y) because the body is not moving

$$W_y = W \cos(45^\circ)$$

$$d) R = W \cos(45^\circ) = 19.6 \times \frac{\sqrt{2}}{2} = 13.86 \text{ N}$$

4) i) $x^2 - 5x + 6 = 0$ $(x-2)(x-3) = 0$
 $x=2$ $x=3$
ii) $x^2 + 7x + 6 = 0$ $x^2 = -1$ $1 \times 6 = 6$ $x+1=0$ $x=-1$
 $(x+1)(x+6) = 0$ $x=-7$ $1+6=7$ $x+6=0$ $x=-6$

$$\text{Pressure} = \frac{F}{A} = \frac{1 \text{ kg} \cdot 1 \text{ m/s}^2}{1 \text{ m}^2} = 1 \text{ m} \times 1 \text{ m}$$

- 3) a) ? $W = 2 \times 9.8 = 19.6 \text{ N}$
 normal reaction (R) is the support force
 frictional force (F) is keeping the body from sliding

b) maximum frictional force (F_{max}) $F_{\text{max}} = \mu R$

in limiting equilibrium, the frictional force is equal to the component of the weight parallel to the incline (W_x)

~~$$W_x = W \sin(45^\circ)$$~~

~~$$F = \mu R$$~~

$$W_x = W \sin(45^\circ) \quad W_x = 19.6 \times \frac{1}{\sqrt{2}} \approx 13.86 \text{ N}$$

- c) As equal forces (R)
 the normal reaction is equal to the perpendicular component of the weight (W_y) because the body is not moving

$$W_y = W \cos(45^\circ)$$

d) $R = W \cos(45^\circ) = 19.6 \times \frac{\sqrt{2}}{2} = 13.86 \text{ N}$

4) i) $x^2 - 5x + 6 = 0$ $(x-2)(x-3) = 0$
 $x=2$ $x=3$
 ii) $x^2 + 7x + 6 = 0$ $x^2 = 1$ $1 \times 6 = 6$ $x+1=0$ $x=-1$
 $(x+1)(x+6) = 0$ $x = -7$ $1+6 = 7$ $x+6=0$ $x=-6$

4) iii) $x^2 + 10x = -25$

quadratic equation $ax^2 + bx + c = 0$

$$x^2 + 10x + 25 = 0$$

$$x^2 = 1 \quad x = 10 \quad 25$$

we need two numbers that multiply to give +25 and add up to give +10

the numbers are +5 and +5

$$5 \times 5 = 25$$

$$5 + 5 = 10$$

$$(x+5)(x+5) = 0 \quad x+5 = 0$$

$$x = -5$$

iv) $x^2 - 2x - 15 = 0$ $x^2 = 1$ $x = -2$

two numbers to give -15 and add up to -2

$$-5, +3$$

$$-5 \times 3 = -15 \quad -5 + 3 = -2$$

$$(x-5)(x+3) = 0 \quad x-5 = 0 \quad x+3 = 0$$

$$x = 5$$

$$x = -3$$

v) $2x^2 + 3x + 1 = 0$ $x^2 = 2$ $x = 3$

two numbers to give $2 \times 1 = 2$ and add up to give 3

$$1, 2 \quad 2 \times 1 = 2 \quad 2 + 1 = 3$$

$$2x(x+1) + 1(x+1) = 0 \quad 2x+1 = 0$$

$$(2x+1)(x+1) = 0 \quad x+1 = 0$$

$$2x+1 = 0 \Rightarrow x = -\frac{1}{2}$$

$$x+1 = 0 \Rightarrow x = -1$$

$$x = -\frac{1}{2}$$

$$x = -1$$

$$2(2x+5y) = 2 \times 7 \quad 4x+10y=14$$

$$5(3x+2y) = 5 \times 5 \quad 15x+10y=25$$

$$4x+10y=14 \quad 15x+10y=25$$

$$(15x+10y) - (4x+10y) = 25-14$$

$$11x = 11$$

$$11x = 11 \Rightarrow x = 1 \leftarrow$$

$$2(1) + 5y = 7$$

$$2 + 5y = 7$$

$$5y = 7 - 2$$

$$5y = 5$$

$$\Rightarrow y = 1 \leftarrow$$

⑦ a) 9 b) i, n c) 3

FINAL GRADE

54/100

GENERAL COMMENTS

Q1 BASE UNITS

[5MARKS]

All Correct , not Cd is symbol for Candela [5 marks]

Q2 DERIVED UNITS

[5 MARKS]

N is not a base unit!!! [3 marks}

Q3 EQUILIBRIUM OF AN OBJECT ON AN INCLINED PLANE

[11 MARKS]

No need for $F = \mu \times R$ as the object is in limiting equilibrium so frictional force is already at its maximum. [10 marks]

Q4 SOLVING QUADRATIC EQUATIONS BY FACTORISING

[15 MARKS]

(ii) incorrectly factorised, should be $(x-2)(x-3) = 0$

in (iii) $x = -5$ twice, else all correct

[12 marks]

Q5 SOLUTION OF QUADRATIC EQUATIONS BY FORMULA

[10 MARKS]

No attempt made [0 marks]

Q6 SIMULTANEOUS LINEAR EQUATIONS

[10 MARKS]

First part no attempt, second part all correct. [5 marks]

Q7 SIMPLE ELECTRICAL CIRCUIT

[9 MARKS]

No workings or sensible solutions

[0 marks]

Total = 35/65, 54%

As submitted a week late, capped at 40%

