Answer Key

ENGINEERING MATHEMATICS

Refresher 02

Exponential LEAP
ONLINE REVIEW

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$(x^{12}+3)$ DIVIDED BY $(x-\sqrt{6})$

Remainder theorem

$(x^{12}+3)$ subst $x=\sqrt{6}$

$$\left[(\sqrt{6})^{12}+3\right]$$

$\boxed{\text{Remainder} = 46{,}659}$

2

$n = 12$

$r = 5$

$n - r = 7$

$p = 0.70$

$q = 0.30$

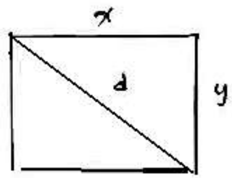
Hence;

$$P = nCr\, p^r q^{n-r}$$

$$= 12C_5 (0.70)^5 (0.30)^7$$

$$\boxed{P = 0.02911}$$

3



$$P = 2x + 2y = 90\text{ cm}$$

$$d^2 = x^2 + y^2 = 35^2$$

Area of Rectangle

$$A = xy$$

$$2x + 2y = 90$$

$$x + y = 45 \longrightarrow (1)$$

$$x^2 + y^2 = 35^2$$

$$x^2 + y^2 = 1225 \longrightarrow (2)$$

Squaring both sides of eq. (1)

$$(x+y)^2 = 45^2$$

$$x^2 + 2xy + y^2 = 2025$$

Substituting eq.(2)

$$1225 + 2xy = 2025$$

$$2xy = 800$$

Hence;

$$A = xy = \frac{800}{2}$$

$$\boxed{A = 400\text{ cm}^2}$$

4

Congruent angle

5

Lumen

6

Impulse

7

Associative law

8

Solid

9

Rhombus

10

ARITHMETIC MEAN

$$A_m = \frac{a_1 + a_2 + \dots + a_n}{n}$$

$$\boxed{A_m = \frac{3a + 4b}{2}}$$

11

$$\frac{3x^2 - 32x - 50}{(x-1)(x-2)(x+3)} = \frac{A}{x-1} + \frac{B}{x-2} + \frac{C}{x+3}$$

mutiply both sides of equation by $(x-1)$

$$\frac{3x^2 - 32x - 50}{(x-2)(x+3)} = A + (x-1)\left[\frac{B}{x-2} + \frac{C}{x+3}\right]$$

subst; $x = 1$

$$A = \frac{3(1)^2 - 32(1) - 50}{(1-2)(1+3)}$$

$$\boxed{A = \frac{79}{4}}$$

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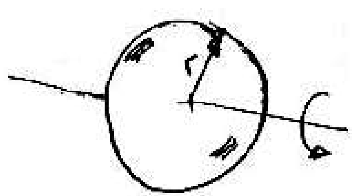
moment of inertia



$$I_{sp} = \frac{2}{5} m r^2$$

$$= \frac{2}{5} \frac{(0.8\ \text{lbs})}{(32.2\ \text{ft/s}^2)} (1.50\ \text{in})^2 \left(\frac{1\ \text{ft}}{12\ \text{in}}\right)^2$$

$$\boxed{I_{sp} = 1.5528 \times 10^{-4}\ \text{ft-lb-sec}^2}$$

13

$R_x = \frac{1}{5}$

$R_y = \frac{1}{7}$

$R_z = \frac{1}{9}$

How long will it take to do the job if x and y work for 2 days then y and z finish the job

$$(R_x + R_y)2 + (R_y + R_z)T = 1$$

$$\left(\frac{1}{5} + \frac{1}{7}\right)2 + \left(\frac{1}{7} + \frac{1}{9}\right)T = 1$$

$$T = 1.2375$$

if x and y finish the job for 2 days and y and z added 1.2375 days Then

$\boxed{\text{x, y and z can finish the job in 3.2375 days}}$

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Exponential LEAP ONLINE REVIEW

Find integral of $12\sin^7 x \cos^7 x\,dx$ from limit of 0 to $\pi/2$

from Wall's Formula

$$\int_0^{\pi/2} \sin^m u \cos^n u\, du = \frac{\left[(m-1)(m-3)\cdots \tfrac{2}{\text{or } 1}\right]\left[(n-1)(n-3)\cdots \tfrac{2}{\text{or } 1}\right]\alpha}{(m+n)(m+n-2)(m+n-4)\cdots \tfrac{2}{\text{or } 1}}$$

$\alpha = \frac{\pi}{2}$ IF both m and n are even

$\alpha = 1$ IF otherwise

$m = 7$ and $n = 7$ are both odd, then $\alpha = 1$

$m + n = 14$

$$= 12\left[\frac{\{(6)(4)(2)\}\{(6)(4)(2)\}(1)}{(14)(12)(10)(8)(6)(4)(2)}\right]$$

$$\boxed{= 0.0429}$$

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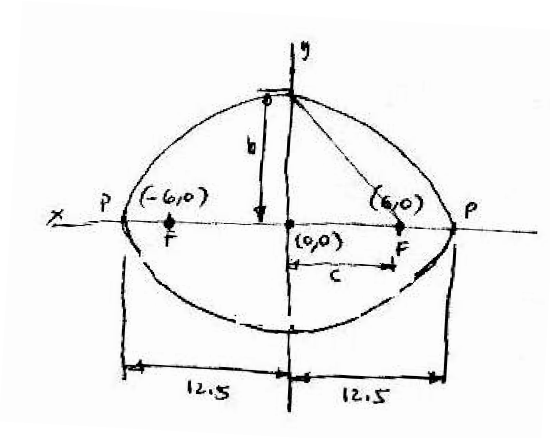

$$\text{eccentricity} = e = \frac{c}{a} < 1$$

$$a^2 = b^2 + c^2$$

$$12.5^2 = b^2 + 6^2$$

$$b^2 = 120.25$$

$$b = 10.9659$$

$$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$$

Hence;

$$a > b$$

$$\boxed{\left(\frac{x}{12.5}\right)^2 + \left(\frac{y}{10.9659}\right)^2 = 1}$$

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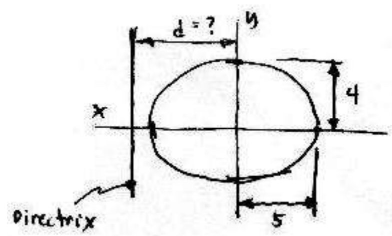
distance from the center to the directrix



$$e = \frac{a}{d} = \frac{c}{a}$$

$$d = \frac{a^2}{c} \quad ; \quad a^2 = b^2 + c^2$$

$$5^2 = 4^2 + c^2$$

$$c = 3$$

substi;

$$d = \frac{5^2}{3}$$

$$d = 8 - \frac{1}{3}$$

$$\boxed{d = 8.3333}$$

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Boyle's law

18

Centrifugal force

19

Congruent

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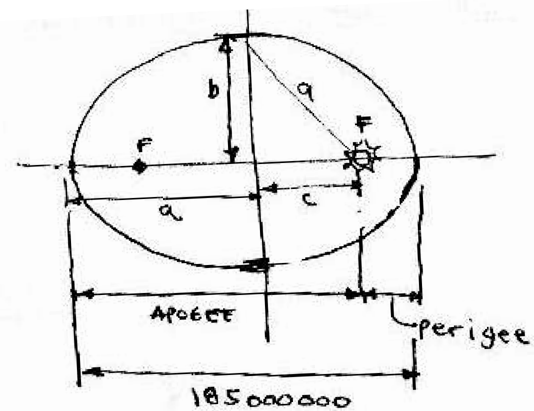

$$e = \frac{c}{a} = \frac{1}{70}$$

Find the Apogee of the earth

$$\text{Apogee} = a + c$$

$$a = \frac{185000000}{2} = 92500000$$

from eccentricity

$$\frac{c}{a} = \frac{1}{70}$$

$$c = (92500000)\left(\frac{1}{70}\right)$$

$$c = 1321428.571$$

Hence;

$$\text{Apogee} = 185000000 + 1321428.571$$

$$\boxed{\text{Apogee} = 186{,}321{,}428.6 \text{ miles}}$$

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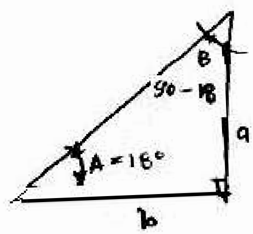
EXPONENTIAL LEAP ONLINE REVIEW

$$\tan(9F+1) = \cot(18)$$



Relationships:

$$\cot A = \frac{b}{a} \Rightarrow \tan B = \frac{b}{a}$$

$$\cot 18° = \frac{b}{a} \Rightarrow \tan 72° = \frac{b}{a}$$

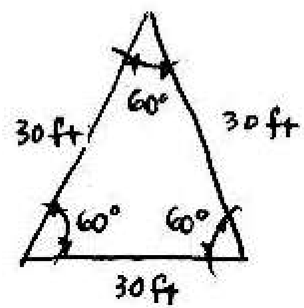
Substi;

$$\cancel{\tan}(9F+1) = \cancel{\tan}\, 72°$$

$$9F + 1 = 72°$$

$$\boxed{F = 7.8889°}$$

Exponential LEAP ONLINE REVIEW



Remarks: Largest triangular area that can be fenced in

$$A = \frac{1}{2} b a \sin\theta$$

$$= \frac{1}{2}(30\ ft)(30\ ft)\sin 60°$$

$$\boxed{A = 389.7114\ ft^2}$$

23

Probability = $\dfrac{\text{No. of Favorable ways}}{\text{No of possible ways}}$

Number of Favorable ways of Getting a sum of 9

D_1	D_2	D_3	
1	2	6	5 ways
	3	5	
	4	4	
	5	3	
	6	2	
2	1	6	6 ways
	2	5	
	3	4	
	4	3	
	5	2	
	6	1	
3	1	5	5 ways
	2	4	
	3	3	
	4	2	
	5	1	
4	4	1	4 ways
	3	2	
	2	3	
	1	4	
5	1	3	2 ways
	2	2	

25 Favorable ways that the sum of 3 Dice is 9

Number of Favorable ways of Getting a sum of 11

D_1	D_2	D_3	
1	6	4	3 ways
	5	5	
	4	6	
2	6	3	4 ways
	5	4	
	4	5	
	3	6	
3	6	2	5 ways
	5	3	
	4	4	
	3	5	
	2	6	
4	6	1	6 ways
	5	2	
	4	3	
	3	4	
	2	5	
	1	6	
5	5	1	5 ways
	4	2	
	3	3	
	2	4	
	1	5	
6	4	1	4 ways
	3	2	
	2	3	
	1	4	

27 Favorable ways that the sum of 3 Dice is 11

Number of favorable ways = 27 + 25 = 52

Since 3 Dice will Fall (1 Dice has 6 Faces)

$(6)(6)(6) = 216$ # of possible ways

thus:

$P = \dfrac{52}{216}$

$\boxed{P = 0.2407}$

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$$\text{Probability} = \frac{\text{No. of favorable ways}}{\text{No. of possible ways}}$$

Probability of randomly drawing 11 white and 7 black

$$P_{(1W \text{ and } 1B)} = \frac{({}^{11}C_1)({}^{7}C_1)}{{}^{18}C_2}$$

$$\boxed{P_{(1W \text{ and } 1B)} = 0.5033}$$

25

$r = 600$ ft

$f = 0.18$

$v = 70$ mph

Solution: $\tan(\theta + \phi) = \dfrac{v^2}{gr}$

$$v = \left(70\ \frac{\text{mil}}{\text{hr}}\right)\left(\frac{1\ \text{hr}}{3600\ \text{s}}\right)\left(\frac{5280\ \text{ft}}{1\ \text{mil}}\right) = 102.6667\ \text{ft/sec}$$

$$\tan(\theta + \phi) = \frac{(102.6667\ \text{ft/sec})^2}{(32.2\ \text{ft/sec}^2)(600\ \text{ft})}$$

$$\theta + \phi = 28.6156^\circ$$

from: $\tan\phi = f = 0.18$

$$\phi = 10.2039^\circ$$

$$\theta + 10.2039^\circ = 28.6156^\circ$$

$$\theta = 18.4116^\circ$$

Hence, the coefficient of friction that sliding will impend

$$\tan\theta = \tan(18.4116^\circ)$$

$$\boxed{f = 0.3330}$$

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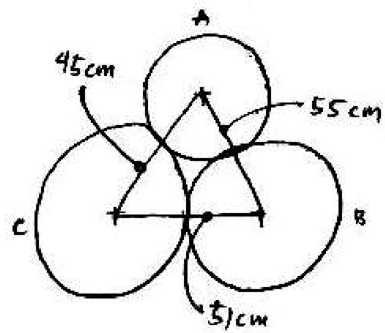

$r_A + r_B = 55$

$r_C + r_B = 51$

$r_C + r_A = 45$

Using Calculator:

$r_A = 24.5$ cm

$r_B = 30.5$ cm

$r_C = 20.5$ cm

Hence; Diameters

$d_A = 49$ cm

$d_B = 61$ cm

$d_C = 41$ cm

27

Exponential LEAP ONLINE REVIEW

$$x + y = 8 \longrightarrow (1)$$

$$x^3 + y^2 = M \longrightarrow (2)$$

Subst eq(1) to (2)

$$y = 8 - x$$

$$x^3 + (8 - x)^2 = M$$

$$x^3 + 64 - 16x + x^2 = M$$

$$\frac{dM}{dx} = 3x^2 - 16 + 2x = 0$$

Solve for x;

$$x = 2 \quad ; \quad x = -8/3 \text{ (disregard)}$$

$$y = 6$$

Hence; $\boxed{x = 2 \text{ and } y = 6}$

Cable

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Point

30

Critical point

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Variables

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Notes receivables

33

Cash

34

All of these

35

Freight-in

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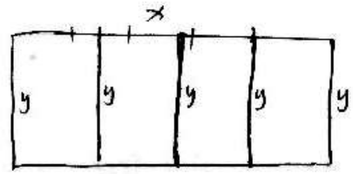

Fencing length of 1800ft

Find the largest field that can be fenced this way

Area is to be maximized

$$2x + 5y = 1800$$

$$A = xy$$

Subst;

$$x = \frac{1800 - 5y}{2}$$

$$A = \left(\frac{1800 - 5y}{2}\right) y$$

$$\frac{dA}{dy} = 900y - \frac{5}{2}y^2$$

$$\frac{dA}{dy} = 900 - \frac{10}{2}y = 0$$

$$y = 180$$

$$x = 450$$

Hence;

$$A = xy = (450)(180)\, ft^2$$

$$\boxed{A = 81\,000\, ft^2}$$

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Probability = $\frac{\text{Number of favorble ways}}{\text{Number of possible ways}}$

Number is even:

$$P = \frac{50}{100} = \frac{1}{2}$$

Number is above 70:

$$P = \frac{30}{100} = 0.30$$

Number is even or above 70

$$P = \frac{1}{2} + 0.30 - \underbrace{\left(\frac{1}{2}\right)(0.30)}$$

Bec. above 70, there are still even numbers

$$P = \frac{13}{20}$$

$$\boxed{P = 0.65}$$

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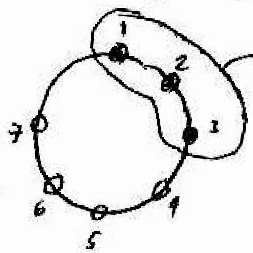
Circular Permutation

$N = (n-1)!$



THINGS THAT ARE TOGETHER

TOTAL permutation

$N = (7-1)! = 720$

w/ 3 people not in consecutive order

$N = (5-1)!\,3! = 144$

$$\left.\begin{matrix}123\\132\\213\\231\\312\\321\end{matrix}\right\}3! = 6$$

Hence;

$N = 720 - 144$

$\boxed{N = 576 \text{ ways}}$

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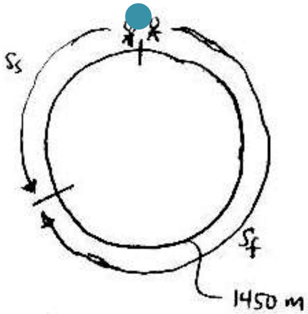


let v_f = be the faster

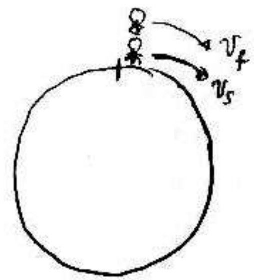
v_s = be the slower

"They meet every 4 minutes"

$$S_f + S_s = 1450\,m$$

$$(4)v_f + (4)v_s = 1450\,m$$

$$v_f + v_s = 362.5\ m/min \longrightarrow eq\ 1$$



"they come abreast every 32 minutes"

$$32v_f - 32v_s = 1450\,m$$

$$v_f - v_s = 45.3125\ m/min \longrightarrow eq\ 2$$

by elimination and substitution to solve for v_f;

$$v_f = \left(203.9063\ \frac{m}{min}\right)\left(\frac{1\,km}{1000\,m}\right)\left(\frac{60\ min}{1\,hr}\right)$$

$$\boxed{v_f = 12.2344\ kph}$$

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	GOLD	SILVER	BAR OF GOLD AND SILVER
IN AIR	20	12	$x+y=105$
	x	y	
IN WATER	19	11	$\frac{19}{20}x+\frac{11}{12}y=99$
	$\frac{19}{20}x$	$\frac{11}{12}y$	

EVERY 20 KILOS OF GOLD IN AIR LOSSES 1 KILO IN WATER

every 12 kilos of silver in AIR losses 1 kilo in WATER

SOLVING for x and y

$$\left.\begin{aligned} x &= 82.5 \text{ kg} \\ y &= 22.5 \text{ kg} \end{aligned}\right\} \text{in air} \qquad \left.\begin{aligned} x &= 78.375 \text{ kg} \\ y &= 20.625 \text{ kg} \end{aligned}\right\} \text{in water}$$

Hence;

$$\boxed{x = 82.5 \text{ kg}}$$

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$$(x + 3y - z)^3$$

$$\downarrow \quad \downarrow \quad \downarrow$$

$$[1 + 3(1) - 1]^3$$

$$\boxed{\text{Sum of coefficients} = 27}$$

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Exponential LEAP ONLINE REVIEW

$$V = (298.3\,cm^3)\left(\frac{1\,m}{100\,cm}\right)^3 = 2.983 \times 10^{-4}\ m^3$$

$$T = 100°C + 273 = 373\ K$$

$$m = (0.852\,gr)\left(\frac{1\,kg}{1000\,gr}\right) = 8.52 \times 10^{-4}\ kg$$

$$P = 120\ kPa$$

from: $P V = n \bar{R} T$

$$(120\,kPa)(2.983 \times 10^{-4}\,m^3) = n\left(8.314\ kJ/kg_{mol}\text{-}K\right)(373\ K)$$

$$n = 1.1543 \times 10^{-5}\ kg_{mol}$$

Hence;

$$MW = \frac{m}{n} = \frac{8.52 \times 10^{-4}\ kg}{1.1543 \times 10^{-5}\ kg_{mol}}$$

$$\boxed{MW = 73.8115\ kg/kg_{mol}}$$

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Sales discount

44

Optics

45

Ampere

46

Dyne

47

Permutation

48

It quadruples

49

Are similar

50

Complementary angles

51

Base

52

Treasury bills or t-bills

53

Golden handshake

54

Bars of gold

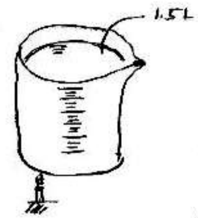
55

Linear expansion: $\Delta L = \alpha L_0 \Delta T$

Area Expansion: $\Delta L = 2\alpha A_0 \Delta T$

Volume Expansion: $\Delta L = 3\alpha V_0 \Delta T$

α = coefficient of linear Expansion



$t_1 = 23°C$

$t_2 = 90°C$

$\alpha_{pyrex} = 3 \times 10^{-6} /°C$

$\alpha_{water} = 72 \times 10^{-6} /°C$

Required: Amount of water overflows

$$\text{Amount of water overflows} = \Delta V_{o\,water} - \Delta V_{o\,pyrex}$$

$$= 3 V_0 \Delta T (\alpha_{water} - \alpha_{pyrex})$$

$$= 3(1.5L)(90-23)°C\,(70\times10^{-6} - 3\times10^{-6})\ 1/°C$$

$$= (0.0202\ L)\left(\frac{1m^3}{1000L}\right)\left(\frac{100\ cm}{1m}\right)^3$$

$$\boxed{\text{Amount of water overflows} = 20.20\ cm^3}$$

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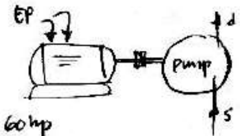

60hp
$\eta_M = 70\%$

$N = 950 rpm$
$\eta_P = 85\%$
$Q = 6.0\ ft^3/sec$
$SG = 0.738$

Find; specific speed

$$N_s = 51.63 \frac{rpm\sqrt{Q, m^3/s}}{(TDH, m)^{3/4}}$$

$$\eta_M = \frac{BP}{EP} * 100\%$$

$$0.70 = \frac{BP}{60hp}$$

$$BP = 42\ hp$$

substi;

$$0.85 = \frac{WP}{42hp}$$

$$WP = (35.7\ hp)\left(\frac{0.746\ kW}{1hp}\right) = 26.6322\ kW$$

from;

$$WP = Q\gamma_{GAS}\,TDH$$

$$26.6322\ kW = \left(6.0\frac{ft^3}{sec}\right)\left(\frac{1m}{3.28ft}\right)^3\left(9.81\frac{kN}{m^3}\right)(0.738)\ TDH$$

$$TDH = 21.6348\ m$$

Hence;

$$N_s = 51.63\ \frac{(950rpm)\sqrt{0.17\ m^3/s}}{(21.6348m)^{3/4}}$$

$$\boxed{N_s = 2015.9768\ rpm}$$

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work problem

$$\frac{n_1 T_1}{W_1} = \frac{n_2 T_2}{W_2}$$

TO EXCAVATE:

$$\frac{(8)(8)}{16} = \frac{(10)(x)}{25}$$

$$x = 10 \text{ hrs}$$

TO BACKFILL:

$$\frac{(3)(5)}{12} = \frac{(10)y}{25}$$

$$y = 3.125 \text{ hrs}$$

total time to excavate & Backfill

$$\boxed{x + y = 13.125 \text{ hrs}}$$

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$C_o = ₱130{,}000$

$L = 8$ yrs

Resale value $= ₱25{,}000$

$O/M = ₱2{,}400$; increased by ₱600 each year

$i = 17\%$

Ownership in terms of Present worth

$$PW = C_o + \left(A + \frac{G}{i}\right)\left[\frac{1-(1+i)^{-N}}{i}\right] - \frac{NG}{i}(1+i)^{-N}$$

$$= ₱130{,}000 + \left(₱2400 + \frac{₱600}{0.17}\right)\left[\frac{1-(1+0.17)^{-8}}{0.17}\right] - \frac{(8)(₱600)}{0.17}(1+0.17)^{-8}$$

$$\boxed{PW = ₱146{,}905.0848}$$

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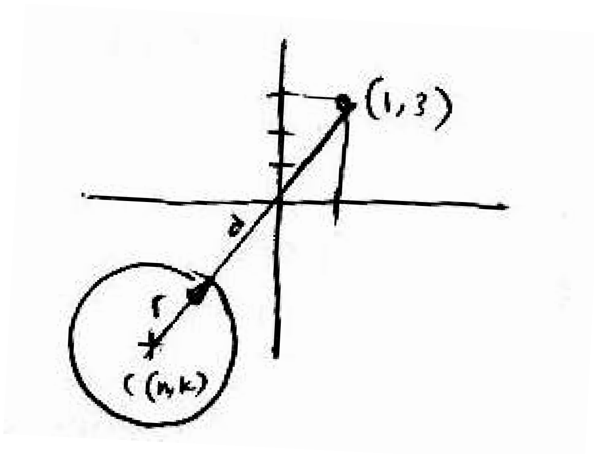

$D = d + r$

$d = D - r$

Solving for r;

$(x^2 + 12x + 36) + (y^2 + 8y + 16) = -30 + 36 + 16$

$(x+6)^2 + (y+4)^2 = 22$

$c(-6, -4)$; $r = 4.6904$

Distance Formula

$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$= \sqrt{(1+6)^2 + (3+4)^2}$

$D = 9.8995$

Hence;

$d = 9.8995 - 4.6904$

$\boxed{d = 5.2091 \text{ units}}$

60

Probability of Drawing A Black King and an Ace in Succession

$P_{BLACK} = \frac{2}{52}$

note: keywords "And" use multiplication
"OR" use addition

$P_{ACE} = \frac{4}{52}$

Hence;

$$P = \left(\frac{2}{52}\right)\left(\frac{4}{52}\right)$$

$$\boxed{P = 0.002959}$$

61

$D_1 = 4\,cm$ $\quad D_2 = 3\,cm$

$N_1 = 250\,rpm$ $\quad N_2 = 350\,rpm$

$P_1 = 65\,kW$ $\quad P_2 = ?$

$P \propto N \propto D^3$

$$P = kND^3$$

$$65\,kW = k(250\,rpm)(4\,cm)^3$$

$$k = \frac{13}{3200}\ \frac{kW}{rpm\text{-}cm^3}$$

Hence;

$$P = \left(\frac{13}{3200}\ \frac{kW}{rpm\text{-}cm^3}\right)(350\,rpm)(3\,cm)^3$$

$$\boxed{P = 38.3906\,kW}$$

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$$₱45000 = (₱15000 - ₱1000)\left[\frac{1-(1+i)^{-10}}{i}\right] + ₱2500(1+i)^{-10}$$

Trial and error or using calculator:

$$\boxed{i = 28.75\%}$$

63

Barter

64

Auction

65

Embargo

Idle money

Variance

68

Directrix

69

2.99792×10^3 m/s

70

Subtrahend

71

$C_0 = ₱300,000$

$C_L = ₱35000$

$L = 10$ yers

Straight line Depreciation Method

$C_5 = C_0 - nd$

$$d = \frac{C_0 - C_L}{L} = \frac{₱300000 - ₱35000}{10} = ₱26,500$$

Hence;

$C_5 = ₱300000 - (5)(₱26,500)$

$\boxed{C_5 = ₱167500}$

$$e_i = \left(1 + \frac{i_n}{m}\right)^m - 1$$

$$= \left(1 + \frac{0.08}{2}\right)^2 - 1$$

$e_i = 8.16\%$ effective annual rate

Hence;

$$A\left[\frac{(1.04)^{40} - 1}{0.04}\right] = ₱12000\left[\frac{(1.0816)^6 - 1}{0.0816}\right]$$

$$\boxed{A = ₱930.1406}$$

73

$$P = F(1+i)^{-N}$$

$$= ₱15{,}000\left(1+\frac{0.05}{4}\right)^{-4(10)}$$

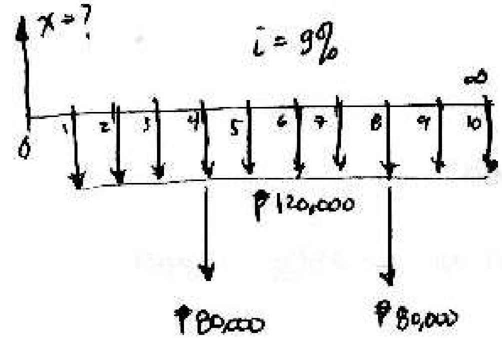
$$\boxed{P = ₱9126.20}$$

74

$$P = ₱1800\left[\frac{1-(1.06)^{-50}}{0.06}\right]$$

$$\boxed{P = ₱28\,371.3492}$$

75

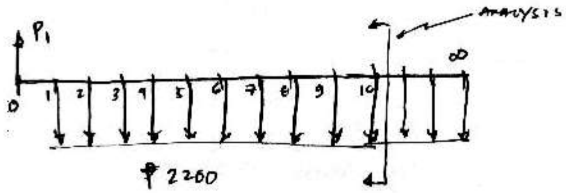


$$\text{CAPITALIZED COST} = \frac{₱120{,}000}{0.09} + \frac{₱80{,}000}{(1.09)^4 - 1}$$

$$\boxed{\text{CAPITALIZED COST} = ₱1{,}527{,}705.477}$$

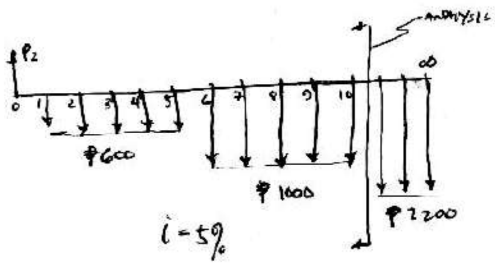
76

OLD MAINTENANCE COST



DUE TO PLACEMENT OF NEW PAVEMENT

NEW maintenance cost

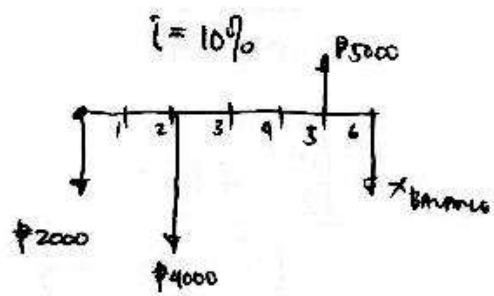


Comparison is 10 years period only

$$P_2 = ₱600\left[\frac{1-(1.05)^{-5}}{0.05}\right] + ₱1000\left[\frac{1-(1.05)^{-5}}{0.05}\right](1.05)^{-5}$$

$$\boxed{P_2 = ₱5989.9443}$$

77



$$x = ₱4000(1.10)^5 + ₱2000(1.10)^6 - ₱5000(1.10)^1$$

$$\boxed{x = ₱4485.162}$$

$$F = P(1+i)^N$$

$$= ₱480(1.15)^8$$

$$\boxed{F = ₱1468.3310}$$

79

Entrepreneur

80

Consol

81

Imaginary numbers

82

D

83

Exponential LEAP Online Review

DISCOUNTED PAYBACK PERIOD

$$P = A\left[\frac{1-(1+i)^{-N}}{i}\right] \qquad i = 19\%$$

$$₱28{,}000 = ₱16{,}000\left[\frac{1-(1.19)^{-N}}{0.19}\right]$$

USING CALCULATOR:

$$\boxed{N = 2.3237 \text{ years}}$$

84

CAPITALIZED COST OF EQUIPMENT = ₱150,000

$i = 13\%$

$C_L = ₱8000$

$L = 10$ years

REPLACEMENT COST OF EQUIPMENT

$$CC = C_o + P_{o/m} + \frac{C_o - C_L}{(1+i)^N - 1}$$

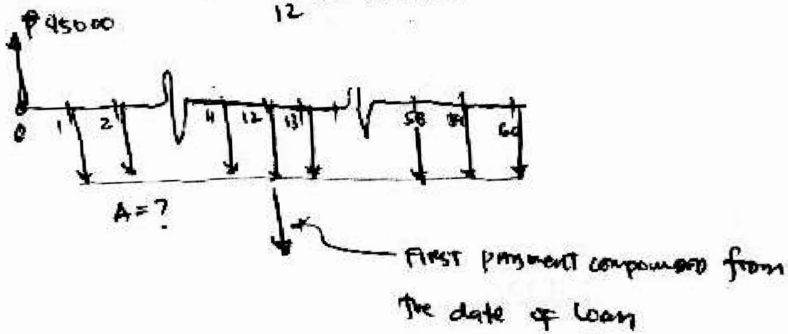
$$₱150000 = C_o + 0 + \frac{C_o - ₱8000}{(1.13)^{10} - 1}$$

$$\boxed{C_o = ₱108,168.4546}$$

85

$i_n = 15\%$ compounded monthly

$i = \frac{0.15}{12} = 0.0125$



$$A\left[\frac{1-(1.0125)^{-60}}{0.0125}\right](1.0125)^{-11} = ₱45,000$$

$$\boxed{A = ₱1227.300}$$

86

Mode

87

Pentagon

88

Segment

89

Scientific notation

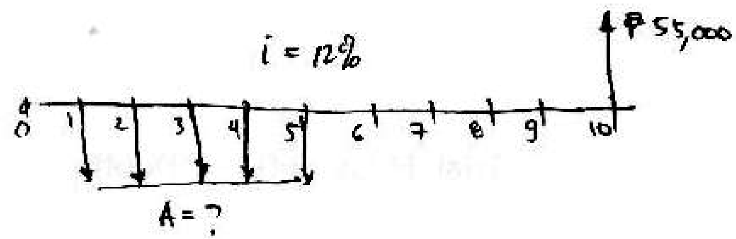
90

Spherical segment

91

Bisector of an angle

92



$$A\left[\frac{(1.12)^5-1}{0.12}\right] = ₱55000\,(1.12)^{-5}$$

$$\boxed{A = ₱4{,}912.5180}$$

93

$$I = Pin$$

$$= (₱12000)(0.15)(1)$$

$$I = ₱1800$$

Then;

$$₱12{,}000 - ₱1800 = ₱10200$$

and from

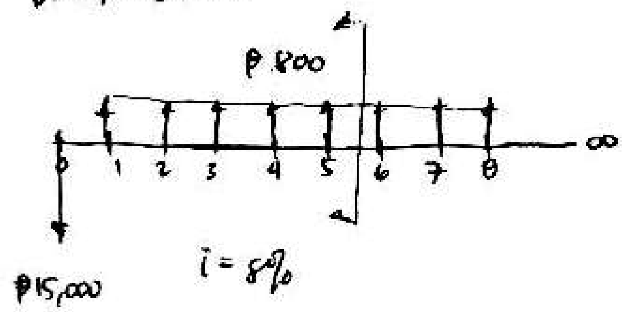
$$F = P(1 + in)$$

$$₱12{,}000 = ₱10200[1 + (i)(1)]$$

$$i = 0.1765$$

$$\boxed{i = 17.65\%}$$

Break-EVEN



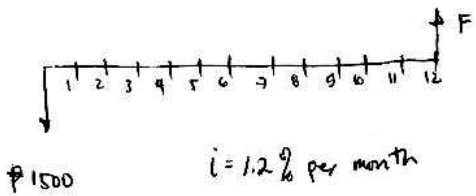
[Income = Expenses]

$$x + ₱800\left[\frac{(1.08)^5 - 1}{0.08}\right] = ₱15000\,(1.08)^5$$

$$\boxed{x = ₱17346.6404}$$

95

Exponential LEAP ONLINE REVIEW



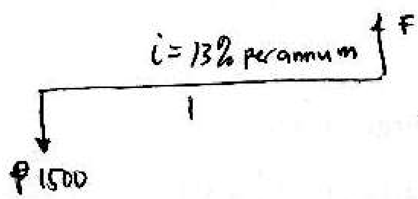
$i = 1.2\%$ per month

$I_1 = F - P$

$F = ₱1500(1.012)^{12} = ₱1730.8419$

$I_1 = ₱1730.8419 - ₱1500$

$I_1 = ₱230.8419$



$i = 13\%$ per annum

$I_2 = F - P$

$F = ₱1500(1.13)^1 = ₱1695$

$I_2 = ₱1695 - ₱1500$

$I_2 = ₱195$

Hence;

$\text{Savings} = I_1 - I_2$

$= ₱230.8419 - ₱195$

$\boxed{\text{Savings} = ₱35.8419}$

96

Exterior angle

97

Curve

98

Inscribed

Operating in corrosive atmosphere

$C_o = ₱450$

$L = 6$ years

If treated for corrosion resistance

$C_o = ₱800$

$L = ?$ $\quad i = 8\%$

[Capitalized cost for untreated = Capitalized cost for treated]

$$₱450 + \frac{₱450}{(1.08)^6 - 1} = ₱800 + \frac{₱800}{(1.08)^N - 1}$$

$$\boxed{N = 13.9215 \text{ years}}$$

100

Break-even Point

$$PW_{PLAN\,A} = PW_{PLAN\,B}$$

$$₱100{,}000 = ₱75{,}000 + ₱50{,}000(1.09)^{-N}$$

$$\boxed{N = 8.0432 \text{ years}}$$