



Date 6/8/2020

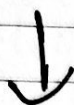
M T W T F S S

Problem of the Day 141!

$$8 \div 2(2+2) = ?$$

1)

$$8 \div 2(4)$$



$$\underline{8} \div \underline{2}(4)$$



$$(4)(4) = \boxed{16}$$

PEMDAS

Not in FractionSo MD
are left to
right!

2) Fraction

$$\frac{8}{2(2+2)} \rightarrow \boxed{1}$$



Date 6 / 09 / 2026 M T W T F S S

Problem of the Day 142!

Solve

$$\sqrt{25} + \sqrt{36}$$

$$\sqrt{25} + \sqrt{36}$$

$$\downarrow$$
$$5$$

$$\downarrow$$

$$+$$

$$6$$

$$= \boxed{11}$$



problem of the Day 143!

What has a bigger area
a square with sides = 7
or a circle with a $r = 4.5$

$$A_s = 7 \cdot 7 = 49 \text{ units}^2$$

$$A_c = \pi r^2 = \pi \cdot (4.5)^2 = \underline{63.6 \text{ units}^2}$$

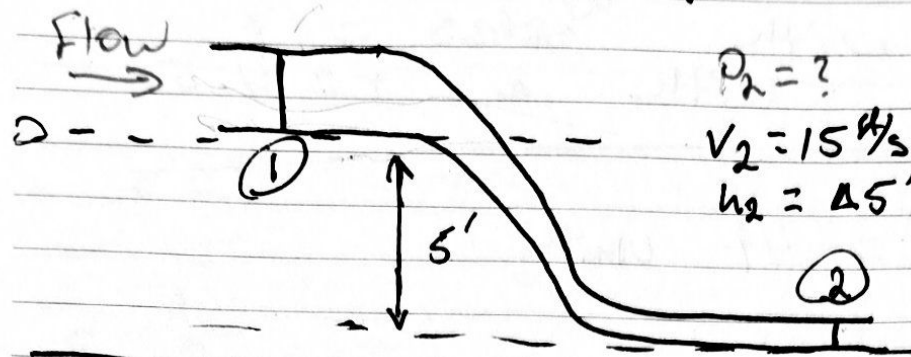
circle is bigger (more area)



Date 6/10/2026 M T W T F S S

Problem of the Day 144!

Solve for the pressure @ point 2

 $P_2 = ?$

given:

$$Q_1 = Q_2$$

$$V_2 = 15 \text{ ft/s}$$

$$V_1 = 10 \text{ ft/s}$$

$$h_2 = 45'$$

$$P_1 = 30 \text{ psi} = 4,320 \text{ psf}$$

$$h_1 = 0' \quad g = 32.2 \text{ ft/s}^2$$

$$\rho = 1.94 \text{ slugs/ft}^3$$

$$P_1 + \rho g h_1 + \frac{1}{2} \rho V_1^2 = P_2 + \rho g h_2 + \frac{1}{2} \rho V_2^2$$

①

$$4,320 + (1.94)(32.2)(0) + \frac{1}{2}(1.94)(10)^2$$

$$= P_2 + (1.94)(32.2)(5) + \frac{1}{2}(1.94)(15)^2$$

②

$$4,320 \text{ psf} + 0 \text{ psf} + 97 \text{ psf} = P_2 + 312.34 \text{ psf} + 218.25$$

③

$$4,417 \text{ psf} = P_2 + 530.59 \text{ psf}$$

$$P_2 = 3,886.41 \text{ psf}$$

$$P_2 = 26.99 \text{ psi}$$



Date 6/12/2026

M T W T F S S

problem of the Day 145!
Solve the Derivative!

$$f(x) = \cos(e^x)$$

$$f(x) = \cos(e^x)$$

$$f'(x) = -\sin(e^x) \cdot e^x$$

$$\star \frac{d}{dx}(f(g(x))) = f'(g(x)) \cdot g'(x)$$

$$\star g'(x) = e^x \quad \star g(x) = e^x$$



Date 6/13/2026

M T W T F S S

problem of the Day 146!
Solve the Derivative!

$$f(x) = \tan(x^2) + 7x^{1-1}$$

$$f'(x) = \sec^2(x^2) \cdot 2x + 7$$

$$\boxed{f'(x) = 2x \sec^2(x^2) + 7}$$



Date 6/14/2026 M T W T F S S

Problem of the Day 147!
Solve the Derivative!

$$f(x) = \cos\left(\frac{x^3}{2}\right)$$

$$f'(x) = -\sin\left(\frac{x^3}{2}\right) \cdot \frac{3x^2}{2}$$

$$= -\frac{3x^2}{2} \sin\left(\frac{x^3}{2}\right)$$



Date 6/15/2026

M T W T F S S

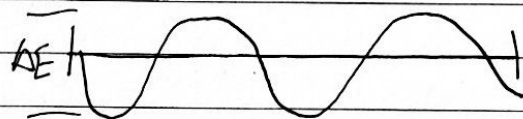
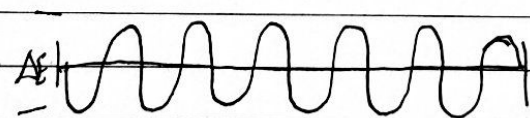
problem of the Day 148!

wave length + Frequency!

$$\lambda = \frac{v}{f}$$

 λ = Wave length (this is in units of Distance) v = Velocity of the wave (m/s) ect... f = Frequency of Wave this is in Hz or s^{-1}

I think of Frequency as the How many waves I can fit in a given space

Low Frequency High Frequency 

* Higher Frequency the shorter the wavelength

* High Frequency waves carry more energy than lower frequency waves with the same amplitude

Amplitude = height of a wave basically



Date 6/16/2026 M T W T F S S

problem of the Day 149!

If a wave has a speed of
10 m/s + has a frequency of
150 Hz what is the wave length?

$$\lambda = \frac{v}{f}$$

$$v = 10 \text{ m/s}$$

$$f = 150 \text{ Hz}$$

$$\lambda = \frac{10 \text{ m/s}}{150 \text{ Hz}} = \boxed{0.067 \text{ m}}$$



Date 6/17/2026 M T W T F S S

problem of the Day 150!

If a wave has a wave length of 1.5 m + a frequency of 250 Hz what is the velocity in (m/s) ?

$$\lambda = \frac{v}{f}$$

Where, $v = ?$

$$\lambda = 1.5 \text{ m}$$

$$f = 250 \text{ Hz}$$

$$1.5 \text{ m} = \frac{v}{250 \text{ Hz}}$$



$$1.5 \text{ m} \cdot 250 \text{ Hz} = v$$

$$\boxed{375 \text{ m/s} = v}$$

Date 6/18/2026 M T W T F S S

Problem of the Day 151!
Solve the problem!

$$\frac{x+3}{5x+2} + \frac{2x}{7x-1} = ?$$

① Find a common denominator!

$$\frac{(\cancel{7}x-1)}{(7x-1)} \frac{x+3}{5x+2} + \frac{2x}{7x-1} \frac{(5x+2)}{(5x+2)}$$

$$\begin{aligned} (7x-1)(5x+2) &= 35x^2 + 14x - 5x - 2 \\ &= 35x^2 + 9x - 2 \end{aligned}$$

$$\begin{aligned} (7x-1)(x+3) &= 7x^2 + 21x - x - 3 \\ &= 7x^2 + 20x - 3 \end{aligned}$$

$$(5x+2)(2x) = 10x^2 + 4x$$

②

$$\frac{7x^2 + 20x - 3}{35x^2 + 9x - 2} + \frac{10x^2 + 4x}{35x^2 + 9x - 2}$$

$$\frac{17x^2 + 24x - 3}{35x^2 + 9x - 2}$$

Simplify



Date 6/19/2026 M T W T F S S

problem of the Day 152! Solve the problem!

$$\log_6(35) = ?$$

$$\log_a(x) = \frac{\ln(x)}{\ln(a)}$$

$$\log_6(35) = \frac{\ln(35)}{\ln(6)} = \frac{3.55535}{1.79176}$$

$$= 1.9843$$



Date 6/20/2026 M T W T F S S

Problem of the Day 153! Solve the
log!

$$\log_{10}(27) = ?$$

rewrite in exponential form with the base of 3

$$\log_{10}(3^3)$$

$$\star \log_a(b^c) = c \log_a(b)$$

$$= 3 \log_{10}(3) = \boxed{1.43136}$$

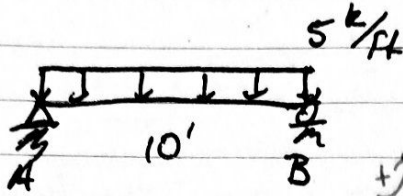


Date 6/21/2026

M T W T F S S

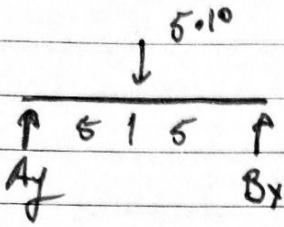
Problem of the Day 154!

Solve for Reaction Forces in the Beam!



$$+\uparrow \sum M_A = 0 = -50(5) + B_y(10)$$

$$B_y = 25 \text{ k}$$



$$+\uparrow \sum F_y = 0 = A_y + 25 \text{ k} - 50$$

$$A_y = 25 \text{ k}$$



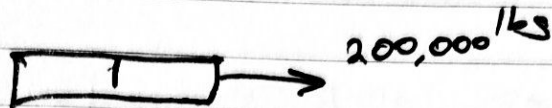
Date 6/22/2026 M T W T F S S

Problem of the Day 155!

Solve for the normal stress in tension of the rod!

A rod is 2 in^2 of area + it is being pulled @ a force of $200,000\text{ lbs}$
what is the normal stress?

$\sim 2\text{ in}^2$



$$\sigma = \frac{F}{A}$$

$$\sigma = \frac{200,000}{2} = \boxed{100,000 \text{ psi}}$$

$$F = 200,000 \text{ lbs}$$

$$A = 2\text{ in}^2$$



Date 6/23/2026 M T W T F S S

Problem of the Day 186!

Solve for the shear stress in the bolt
The bolt has an area of 1.5 in^2
+ a shear force of $10,000 \text{ lbs}$

$$\tau = \frac{F}{A}$$

$$\tau = \frac{F}{A} = \frac{10,000}{1.5} = \boxed{6,666.7 \text{ psi}}$$

$$F = 10,000 \text{ lb}$$

$$A = 1.5 \text{ in}^2$$



Date 6/24/2026 M T W T F S S

Problem of the Day 157!

What is Poisson's Ratio?

$$\text{POISSON'S Ratio} = \frac{\text{Lateral Strain}}{\text{Longitudinal Strain}} = \nu$$

Poisson's Ratio quantifies how a material deforms under a load in a given Direction.

Low Poisson's Ratio means the material doesn't change much when a deformation load is applied.

High Poisson's Ratio means the material does change a lot "thins out" when a deformation load is applied.

High Poisson Ratio $\rightarrow$ rubber

Low Poisson Ratio $\rightarrow$ glass & cast iron



Date 6/25/2026 M T W T F S S

Problem of the Day 158!

Solve for x

$$2x - 3 = 6$$

$$2x - 3 = 6$$

$$3 + 2x - 3 = 6 + 3$$

$$\frac{2x}{2} = \frac{9}{2}$$

$$x = 4\frac{1}{2}$$



Date 6/26/2026 M T W T F S S

Problem of the Day 159!

you get 3% a year in a checking account if you deposit \$10,000 a year. How much interest will you get in 5 years if you don't spend anything?

$$FV = A \left[\frac{(1+i)^n - 1}{i} \right] = 10,000 \left[\frac{(1.03)^5 - 1}{0.03} \right]$$

$$A = 10,000$$

$$n = 5$$

$$i = 0.03$$

$$= 10,000 \cdot 5.309$$

$$= 53,091.35$$

you put in 50,000

so you made \$3,091.35



Date 6/27/2020 M T W T F S S

problem of the Day 160!

If a piece of A36 steel

is loaded but we don't know the force
but know the following

$$E = 29,000,000 \text{ psi}$$

$$\epsilon = 0.002 \text{ in-in}$$

$$A = 3 \text{ in}^2$$

Eq 1

$$E = \frac{\sigma}{\epsilon}$$

Eq 2

$$\sigma = \frac{P}{A}$$

Eq 1

$$29,000,000 = \frac{\sigma}{0.002}$$

$$29,000,000 \cdot 0.002 = \sigma = \frac{58,000}{\cancel{174,000}}$$

Eq 2

$$\frac{58,000}{\cancel{174,000}} = \frac{P}{3}$$

$$\frac{58,000}{\cancel{174,000}} = \frac{P}{3}$$

$$174,000 \text{ lb} = 174 \text{ kips}$$

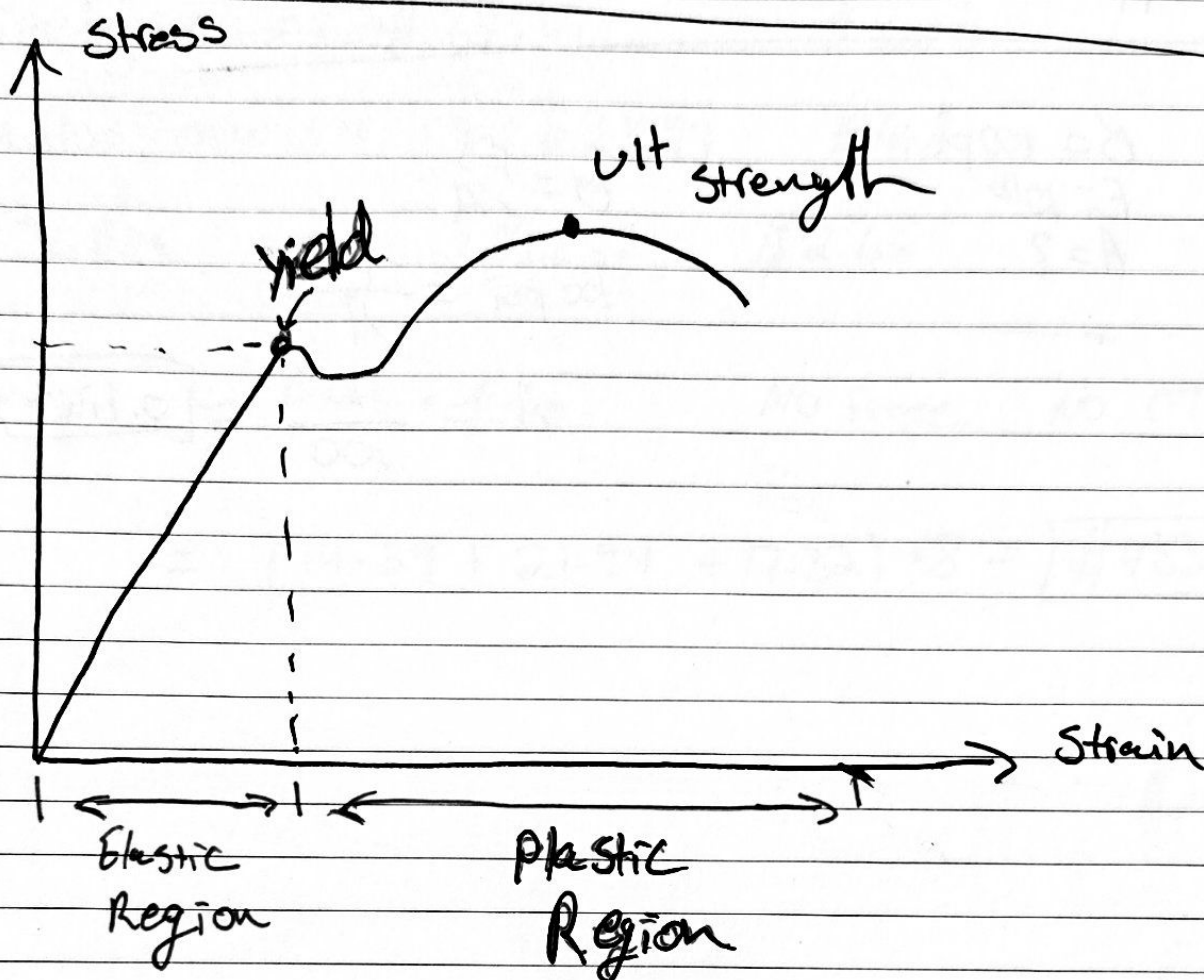
$$P = \frac{58,000}{\cancel{174,000}} \cdot 3 = \frac{174,000 \text{ lbs}}{\cancel{174,000}} = 174 \text{ kips}$$



Date 6/28/2026 M T W T F S S

Problem of the Day 161:

What is the yield point on the stress + strain diagram for steel?



(Steel) stress strain Diagram

WWW.Universityshortcuts.com



Date 6/29/2026

M T W T F S S

Problem of the Day 162!

What is the Area is the psi (stress) on the Rod is 100 psi + it has 10 lbs applied.

$$\sigma = 100 \text{ psi}$$

$$F = 10 \text{ lb}$$

$$A = ?$$

$$\sigma = F/A$$

$$100 \text{ psi} = \frac{10}{A}$$

$$A = \frac{10}{100} = \boxed{0.1 \text{ in}^2}$$



Date 6/30/2026 M T W T F S S

Problem of the Day 163!

you Have a 8 hour work Day
+ you are installing pipe ~~labor~~ lunch
is labor for the Day?

Pipelayer = $\$14.89$ Rate $\$6.64$ Fringes

Excavator operator = $\$21.94$ $\$6.81$

LABORER = $\$17.32$ $\$2.66$

Formula = Hours • Rate NO Fringe NO OT

$$= (14.89 + 21.94 + 17.32) \cdot 8 = \boxed{\$433.20}$$



Date 7/1/2026 M T W T F S S

Problem of the Day 164!
Find the Derivative!

$$f(x) = x^4 + 3$$

$$f'(x) = 4x^{4-1} + 0$$

$$= 4x^3$$



Date 7/2/2026 M T W T F S S

Problem of the Day 165!
Find the Derivative!

$$f(x) = e^{x^4}$$

$$f'(x) = e^{x^4} (4x^3) = \boxed{4x^3 e^{x^4}}$$

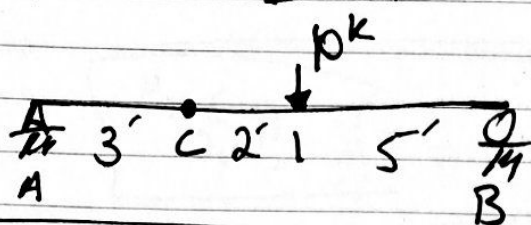


Date 7/3/2026

M T W T F S S

Problems of the Day 166!

Find the Normal moment + shear @ point C.



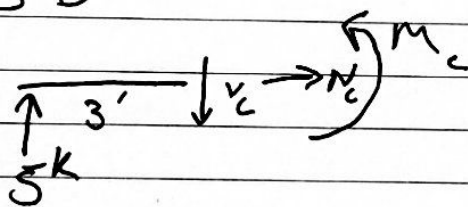
$$+\circlearrowleft \sum M_A = 0 = -10^k(5') + B_y(10)$$

$$B_y = 5^k$$

$$+\uparrow \sum F_y = 0 = -10 + 5 + A_y$$

$$A_y = 5^k$$

FBD



$$\sum F_x = 0$$

Shear + Moment

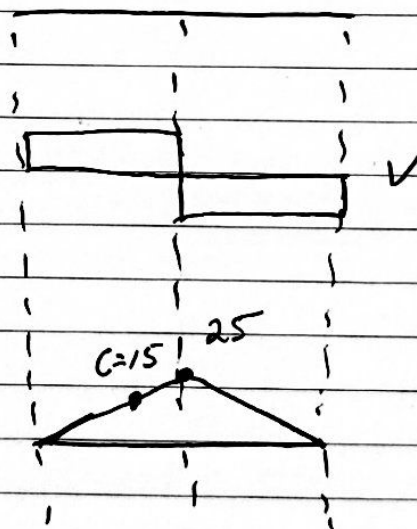
$$\sum F_x = 0 = N_c$$

$$+\circlearrowleft \sum M_c = 0 = M_c - 5^k(3')$$

$$M_c = 15 \text{ k-ft}$$

$$+\uparrow \sum F_y = 0 = 5^k - V_c$$

$$V_c = 5^k$$

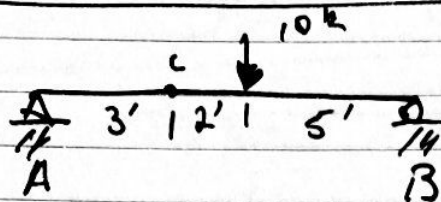




Date 7/4/2026 M T W T F S S

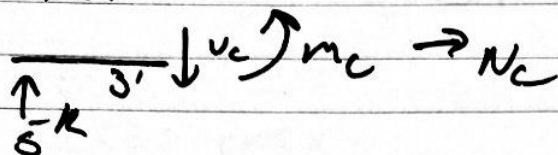
Problem of the Day 167!

Find the shear stress in the beam @ point C $A = 2 \text{ in}^2$



$$B_y = 5 \text{ k}$$
$$A_y = 5 \text{ k}$$

FBP



$$V_C = 5 \text{ k}$$

$$M_C = 15 \text{ k-ft}$$

$$\tau = \frac{F}{A} \rightarrow$$

$$F = 5 \text{ k} = V_C$$
$$A = 2 \text{ in}^2$$

$$\tau = \frac{5}{2} = \boxed{2.5 \text{ ksi}}$$



Date 7 / 5 / 2026 M T W T F S S

Problem of the Day 168!

Solve the integral!

$$\int x^2 dx$$

$$\int x^2 dx = \frac{x^{2+1}}{2+1} + C$$

$$= \frac{x^3}{3} + C$$

$$C = \mathbb{R}$$



Date 7/6/2026 M T W T F S S

Problem of the Day 169!

Find the Derivative!

$$f(x) = e^x \cos x = y$$

Product Rule!

$$y' = f'(x)g(x) + f(x)g'(x)$$

$$f(x) = e^x$$

$$g(x) = \cos x$$

$$f'(x) = e^x$$

$$g'(x) = -\sin(x)$$

$$y' = e^x \cos(x) + e^x (-\sin x)$$

$$= e^x \cos(x) - e^x \sin(x)$$



Date 7/7/2026 M T W T F S S

Problem of the Day! 170!

$$y = \sin x \ln x$$

Product Rule!

$$y' = f'(x)g(x) + f(x)g'(x)$$

$$f(x) = \sin x$$

$$g(x) = \ln x$$

$$f'(x) = \cos x$$

$$g'(x) = \frac{1}{x}$$

$$y' = \cos(x) \ln x + \sin x \cdot \frac{1}{x}$$

$$y' = \cos x \ln x + \frac{\sin x}{x}$$



Date 7/8/2026 M T W T F S S

problem of the Day 171!

Convert 2 mg/L with a flow rate
of 2 MGD (2 million gallons a Day)
to pounds per day.

$$\text{lbs / Day} = \text{Concentration} \cdot \text{Flow rate} \cdot \text{unit conversion of 8.34}$$

$$= 2 \text{ mg/L} \cdot 2 \cdot 8.34 = \boxed{33.36 \text{ pounds / Day}}$$

* 8.34 pounds per gallon
Conversion Factor (water)



Date 7/9/2026 M T W T F S S

Problem of the Day 172!

you have 4 MGD (million gallons a day)
of water coming into your system
with 25 mg/L of pollutant in the water
How many pounds per day is this?

$$\text{pounds/day} = \text{concentration (mg/L)} \cdot \text{volume (MGD)} \cdot 8.34$$

$$= 25 \text{ mg/L} \cdot 4 \cdot 8.34 = \boxed{834 \text{ lb/day}}$$



Date 7/10/2026

M T W T F S S

Problem of the Day 173!

Solve the Derivative!

$$f(x) = (3x^3 + 1)(5x + 2)$$

Product rule

$$y' = f(x)g'(x) + f'(x)g(x)$$

Power rule

$$y' = nx^{n-1}$$

Where n is a #

$$\underline{(3x^3 + 1)} \cdot \underline{(5x + 2)}$$

$$f(x) = 3x^3 + 1$$

$$f'(x) = 9x^2$$

$$g(x) = 5x + 2$$

$$g'(x) = 5$$

$$y' = (3x^3 + 1)(5) + 9x^2(5x + 2)$$

Simplify / distribute

$$y' = 15x^3 + 5 + 45x^3 + 18x^2$$

$$y' = 60x^3 + 18x^2 + 5$$



Date 7/11/2026 M T W T F S S

Problem of the Day 174!

Solve the Derivative!

$$f(x) = 2x^4 + \ln x$$

$$f'(x) = 8x^3 + \frac{1}{x}$$



Date 7/12/2026 M T W T F S S

Problem of the Day 175!

$$y = 4x + 1$$

Find the y-intercept

Set $x = 0$

$$y = 4(0) + 1$$

$$\boxed{y = 1}$$