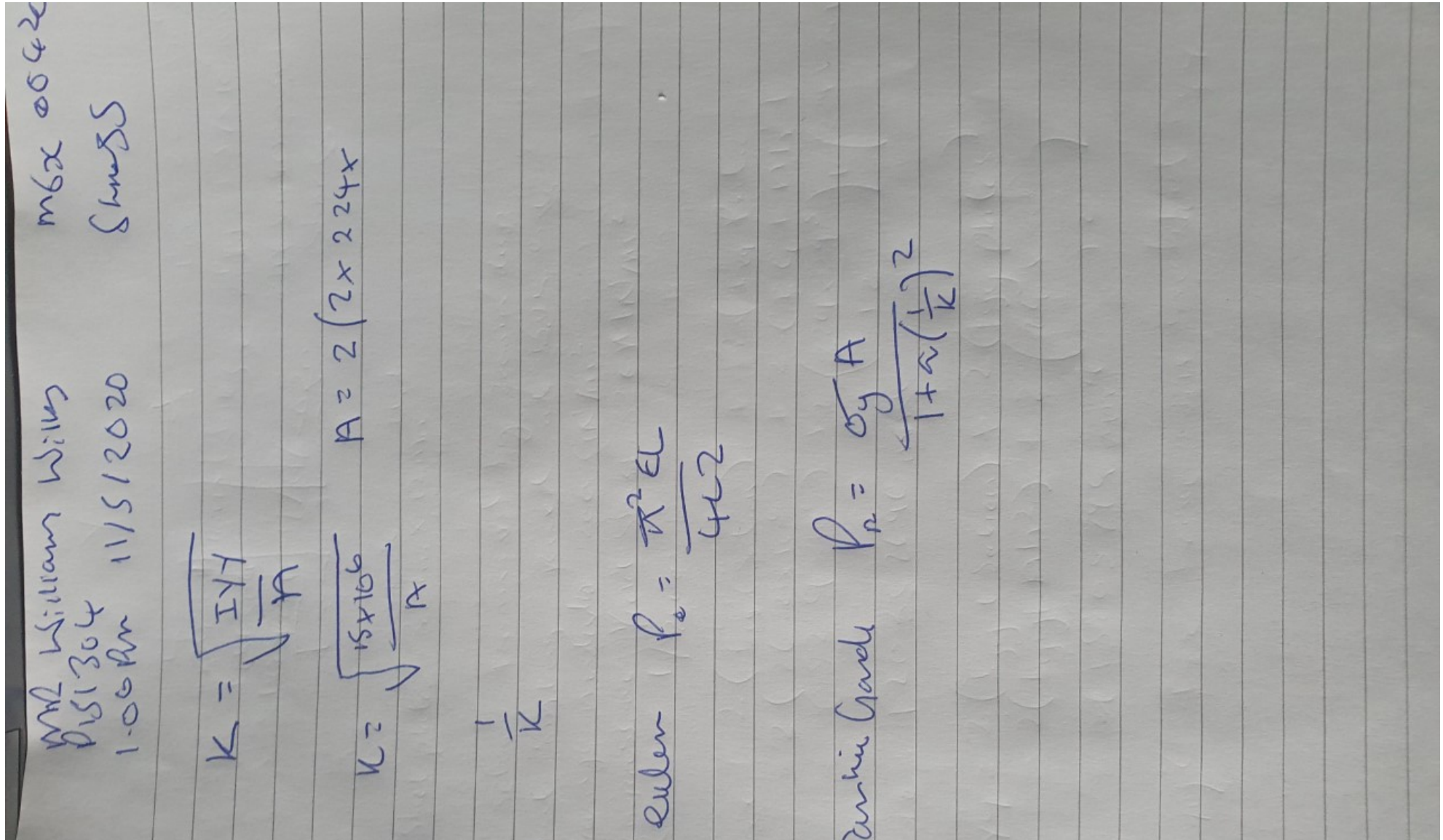


(No subject)

Billy Wilks &lt;BillyWilks@live.co.uk&gt;

Mon 11/05/2020 15:13

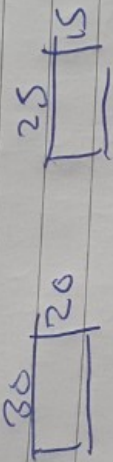
To: William Wilks (P151304) &lt;wwilks.151304@student.uwtsd.ac.uk&gt;



Mr William Wilks  
 P151304  
 1-08-AM 11/5/20  
 30mm by 20mm  
 wall thickness 2.5mm  
 length 2.4m  
 $\sigma = 480 \text{ mPa}$   
 $E = 190 \text{ GPa}$

Mr William Wilks  
 P151304  
 1-08-AM 11/5/20  
 30mm by 20mm  
 wall thickness 2.5mm  
 length 2.4m  
 $\sigma = 480 \text{ mPa}$   
 $E = 190 \text{ GPa}$

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



$A = (30 \times 20) - (2.5 \times 15)$   
 $A = 225 \text{ mm}^2 = 0.225 \text{ m}^2$

$F = 480 \times 10^6 \times 0.225 \times 10^{-6}$   
 $= 108 \text{ kN}$

$U = \frac{P^2 L}{2AE}$

$= \frac{108000^2 \times 2.4}{2 \times 190 \times 10^9 \times 0.225 \times 10^{-6}}$   
 $= 327.41 \text{ J}$

William Wilks M6x06420  
 William Wilks M6x00420  
 04 Advanced Stress and FEA  
 11/5/2020

The Shear Stress  $\tau$  due to load  
 given by  $\tau = \frac{Q}{A\ell}$   $Q = \text{Shear load}$   
 $\ell = \text{length of bar}$   
 $A = \text{Cross section area}$

Shear modulus  $G = \frac{\text{Shear stress}}{\text{Shear strain}}$   
 $G = \text{Shear modulus}$

$\tau = \frac{Q}{A\ell}$  (Since  $\tau = \frac{Q}{A}$ )  
 $\gamma = \frac{Q}{AG}$

Work strain energy  $U$  for a bar is  
 is given by  $U = \frac{Q^2 L}{2AG}$



energy  $= \frac{1}{2} Q \delta$

Element  $= \frac{1}{2} Q \frac{Q}{A\ell}$   
 $= \frac{1}{2} \frac{Q^2}{A\ell}$

Work energy  $= \int_0^L \frac{Q^2}{2AG} d\ell$   $U = \frac{Q^2 L}{2AG}$

M11/11/2020  
 William Wilks  
 11/5/2020  
 stress in the bar should not  
 a value of 65 MPa, from what  
 could a mass of 120 kg bar and  
 bar without exceeding this stress,  
 mention all properties at the  
 as given in part b  
 Vol  
 dia 19.05 mm  
 length 3.5 m  
 Young's modulus 210 GPa  
 stress 285 MPa

$$\Delta = \frac{\sigma^2 V}{2 E m g} - \frac{\sigma L}{E}$$

$$65 \times 10^6 \times \frac{210 \times 10^9 \times (120 \times 10^{-3})^3}{2 \times 210 \times 10^9} - \frac{65 \times 10^6 \times 3.5}{210 \times 10^9}$$

$$2.1 \times 10^{-3} \times \frac{(\pi \times 0.01905^2 \times 3.5)}{4} - \frac{65 \times 10^6 \times 3.5}{210 \times 10^9}$$

$$210 \times 10^9 \times 120 \times 9.81$$

$$485 \times 10^{-3} \text{ m (6.5 mm)}$$

2  
 1513  
 1.001  
 Q2.  
 a: P  
 is Q  
 ii  
 P  
 S  
 S  
 in S  
 Total S

MLR 60420 1 FEA

WEEKS Advanced Stress Analysis with FEA

15/2020 MBK 60420

at element will create wherever your  
any analysis that you carry out  
there, as such.

you would choose the element type  
physical property information  
need for each type.

1st element (2D line) 2 nodes  
2nd element (2D line) 3 nodes  
element 3 or 4 nodes  
tetrahedral 4 nodes  
Pyramid 5 nodes  
all family e.g. Beam  
→ Truss  
→ Rigid  
→ Shell  
4 nodes  
freedom

Physical property adjusts size of  
smaller mesh is needed automatically.  
adjusts the polynomial order of the  
re accuracy

(b)  $\frac{15130}{10000}$  if the  
 exceed  
 height  
 we can  
 use the  
 steel bar

Page num  
MR William  
1:00 pm 11

Q1. Your choice  
results in  
in FEA Sa

a. Discuss how  
and what  
would be

The  
Be  
20  
315

h<sub>1</sub> \* on basis

\* Number a

\* Degrees of

\*

d. h adaptive  
mesh where  
p adaptive a  
mesh is impro

Wilks  
26

20kg  
50mm

2J  
EW

22EW  
V

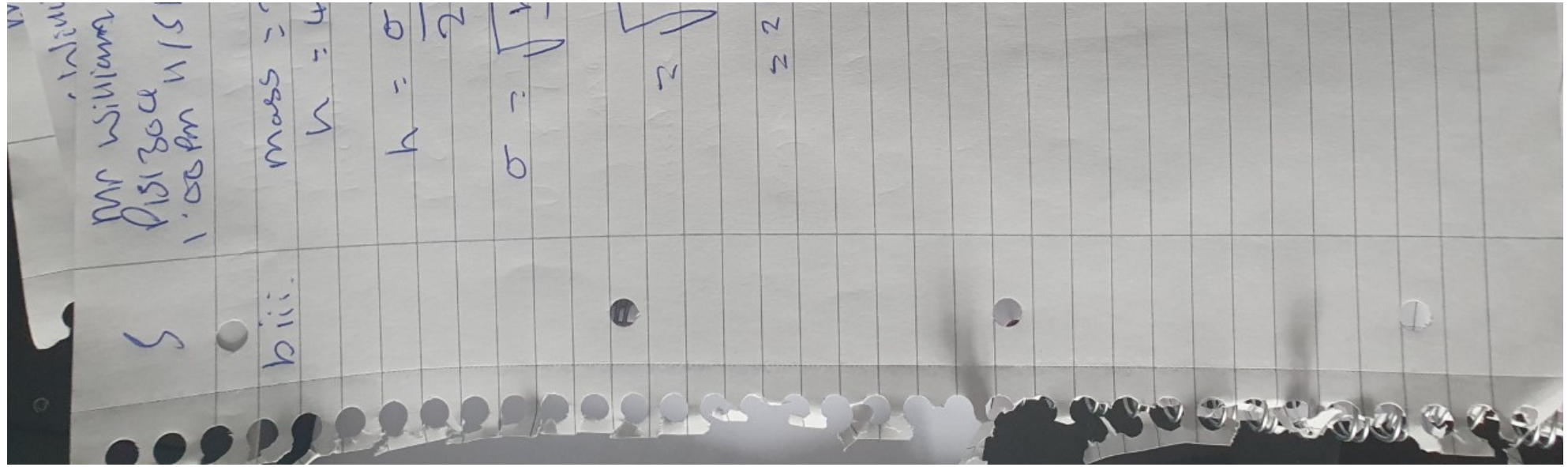
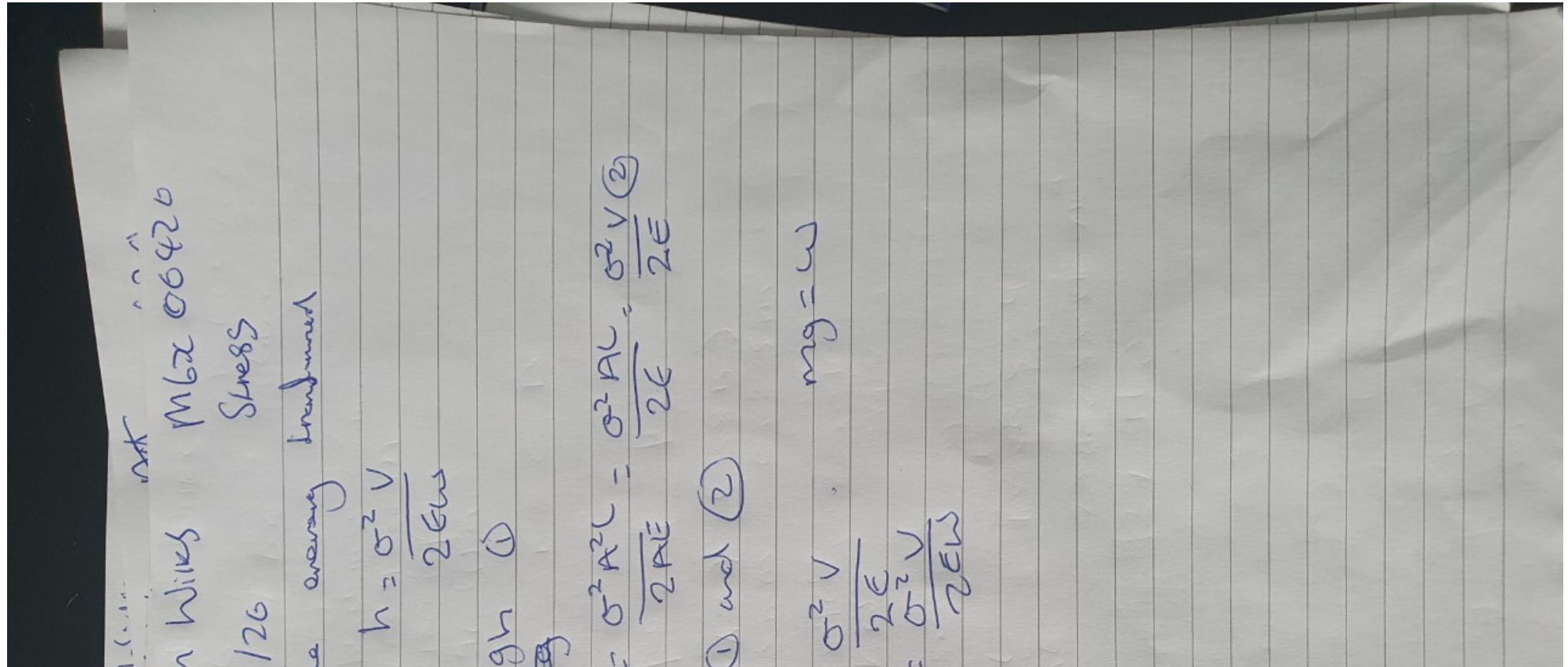
$0.45 \times 2 \times 190 \times 10^9 \times (20 \times 9.81)$

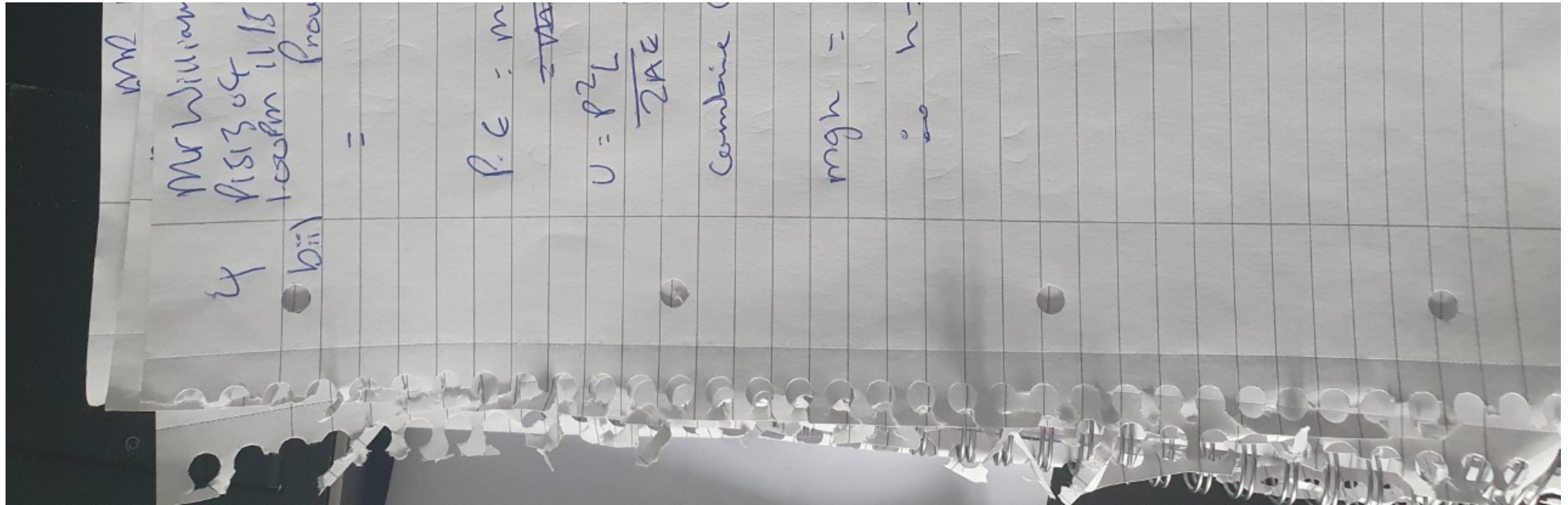
$5.4 \times 10^6$

49.26 MPa

55x  
210

55x  
210





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