1.i. $U(x,y) = \max\{4x, y\}$ $P_x = 12$ $P_y = 2$ $m = 12$ new $P_x = 6$

* For max functions, the optimal point is at one of the intercepts. For points A and C, plug the intercepts into utility function to see which one has higher utility, this is the optimum.

A: B.C.: $12x + 2y = 12$ intercepts: $(1,0)$, $(0,6)$

$\boxed{A: (0,6)}$

* Find point C before B here. Like with perf. subs, B and C will be on the same axis because they use the same price ratios.

C: B.C.: $6x + 2y = 12$ intercepts: $(2,0)$, $(0,6)$

$\boxed{C: (2,0)}$ ← Point B will also have $y_B = 0$.

B: B.C.: $6x + 2y = m'$ ← we don't know the compensated income. Use $U(A) = U(B)$.

$U(A) = U(0,6) = \max\{4 \cdot 0, 6\} = 6 = U(B)$

$6 = \max\{4x_B, y_B\} = \max\{4x_B, 0\} = 4x_B \Rightarrow x_B = 1.5$

$\boxed{B: (1.5, 0)}$

Numerical Values

		X	Y
A → B	SE	+1.5	-6
B → C	IE	+0.5	0
A → C	TE	+2	-6

ii. How much does point B cost?

$6x + 2y = m'$

$6(1.5) + 2(0) = m'$

$\boxed{m' = 9}$

2. Let X be the inferior good. It is also ordinary since the law of demand applies. The other good must be normal since you can't have two inferior goods.

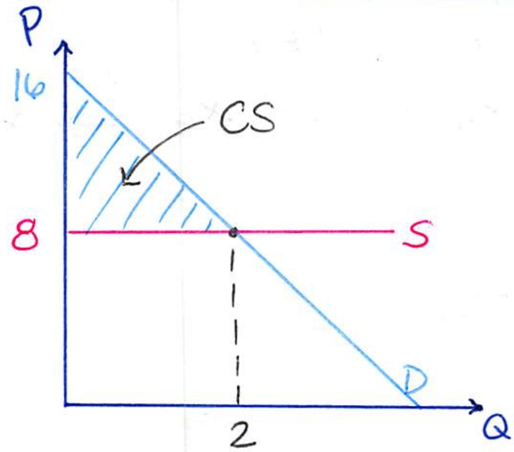
	inf. X	norm. Y	
SE	↓	↑	$P_x \uparrow$
IE	↑	↓	"m" ↓
TE	↓	?	

from tie-breaker (ordinary)

in order for TE ↓ for X, $|SE_x| > |IE_x|$. $\boxed{D.}$

3. i.

Before the tax



Equ: $P = 16 - 4Q$
$8 = 16 - 4Q$
$Q = 2$

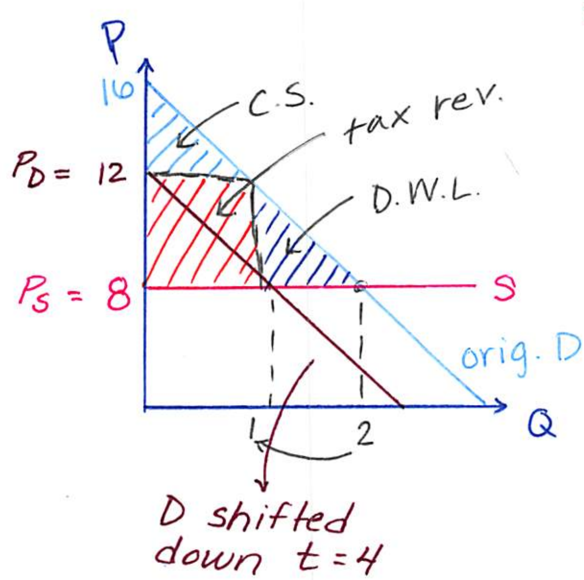
Consumer Surplus: $\frac{1}{2}\cdot(16-8)\cdot 2 = 8$

Producer Surplus: None

$\boxed{P = 8,\ Q = 2,\ CS = 8,\ PS = 0}$

After the tax ($t=4$)

shift demand down 4!



$P_D = P_S + t$

$\overset{P_D}{16 - 4Q} = \overset{P_S}{8} + \overset{t}{4}$
$Q = 1$

$P_D = 8 + 4 = 12$

Consumer Surplus: $\frac{1}{2}\cdot 1\cdot 4 = 2$

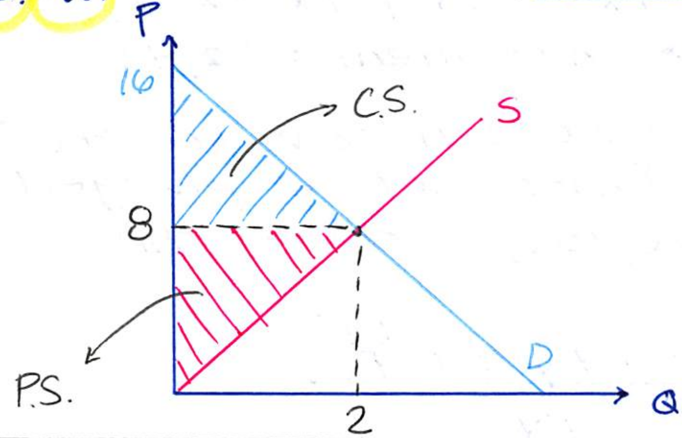
Tax rev.: $\underset{t\cdot Q}{4\cdot 1} = 4$

D.W.L.: $\underset{\frac{1}{2}\cdot\Delta Q\cdot t}{\frac{1}{2}\cdot 1\cdot 4} = 2$

$\boxed{P_D = 12,\ P_S = 8,\ Q = 1,\ CS = 2,\ PS = 0,\ \text{tax rev} = 4,\ DWL = 2}$

3. ii.

Before the tax



Equ.: $P_D = P_S$

$16-4Q = 4Q$

$Q = 2$

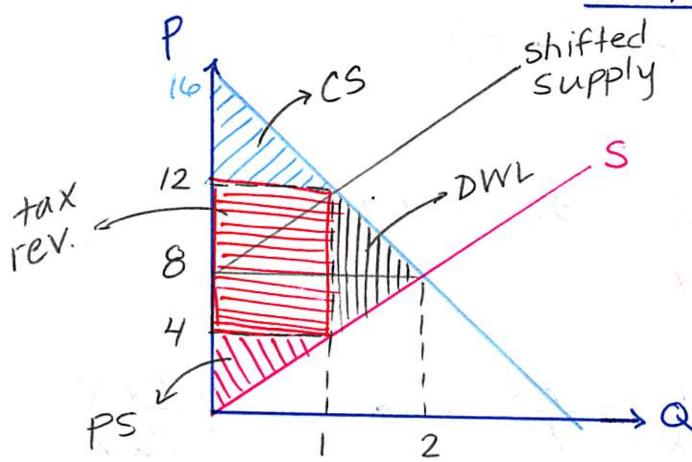
$P_S = 4(2) = 8$

C.S.: $\frac{1}{2}\cdot 8\cdot 2 = 8$

P.S.: $\frac{1}{2}\cdot 8\cdot 2 = 8$

$\boxed{P = 8,\ Q = 2,\ CS = 8,\ PS = 8}$

After the tax ($t=8$)



$P_D = P_S + t$

$16-4Q = 4Q+8$

$Q = 1$

$P_D = 16-4\cdot 1 = 12$

$P_S = 4\cdot 1 = 4$

C.S.: $\frac{1}{2}\cdot 4\cdot 1 = 2$

P.S.: $\frac{1}{2}\cdot 4\cdot 1 = 2$

DWL: $\frac{1}{2}\cdot 1\cdot 8 = 4$ ($\frac{1}{2}\cdot \Delta Q\cdot t$)

tax rev.: $\cdot 1 =$

$\boxed{P_D = 12,\ P_S = 4,\ Q = 1,\ C.S. = 2,\ P.S. = 2,\ DWL = 4,\ \text{tax rev} = 8}$

4. See gauchospace past exams for solution $\boxed{X = 100}$

5. How much will the car cost in one year?

$10{,}000(1+\pi) = 10{,}000(1.6) = 16{,}000$

She will put \$8,000 in the bank and needs it to grow to \$16,000. Present Value = 8,000
Future Value = 16,000

$PV = \frac{FV}{(1+r)} \longrightarrow PV(1+r) = FV \qquad 8{,}000(1+r) = 16{,}000$

$1+r = 2$

$\boxed{A.}$ $\boxed{r = 1 \text{ or } 100\%}$

6. $U(x,y) = \sqrt{x} + \frac{1}{2}y$ B.C. : $P_x \cdot X + P_y \cdot Y = P_x \cdot \omega_x + P_y \cdot \omega_y$

→ endowment = (2,4)

This is a quasi-linear DMRS!

Using the tangency condition you can solve for the following demand functions: (note that we plugged in the endowment point (ω_x, ω_y) because this does not change.

$$x^* = \left(\frac{P_y}{P_x}\right)^2 \qquad y^* = \frac{P_x \cdot 2 + P_y \cdot 4 - \frac{P_y^2}{P_x}}{P_y}$$

A) Plug into demand functions:

$P_x = 1$ $P_y = 1$ $\boxed{A: (1,5)}$

B) $\underline{U(A) = U(B)}$:

$$U(A) = U(1,5) = \sqrt{1} + \frac{1}{2}5 = 3.5 = U(B)$$

$$3.5 = \sqrt{x_B} + \frac{1}{2}y_B \; *$$

tangency condition :

MRS = price ratio → $\frac{1}{\sqrt{x}} = \frac{P_x}{P_y}$ → $x = \left(\frac{P_y}{P_x}\right)^2$

Plug in $P_x = 1$ $P_y = 2$

$x_B = 4$ → * $3.5 = \sqrt{4} + \frac{1}{2}y_B$ → $y_B = 3$

$\boxed{B: (4,3)}$

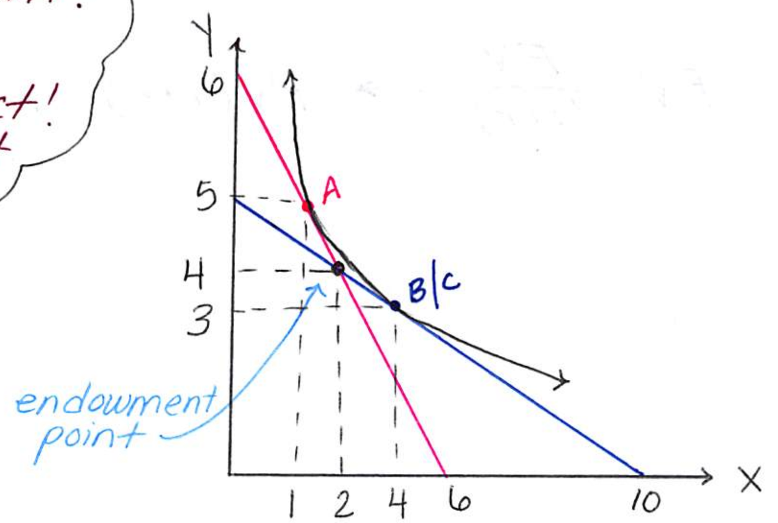
C) Plug into demand functions:

$P_x = 1$ $P_y = 2$ $\boxed{C: (4,3)}$

this should seem weird, but it can happen with quasi-linear!

B & C are the same point! What does this mean? There is no income effect! A, B & C are all tangent to the same IDC!

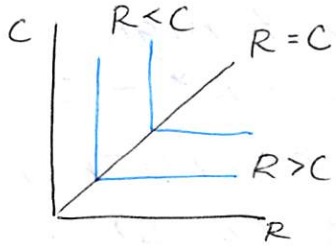
	X	Y
SE	+3	-2
IE	0	0
TE	+3	-2



7. i. She likes to consume R and C in a one-to-one ratio! This is a min function!

$U(R,C) = \min(R,C) \quad p = 10 \quad w = 10 \quad M = 0 \quad \bar{L} = 10$

Reservation wage is MRS at the point $R = \bar{L}$, $C = M$.



For perf. comp., MRS = 0 along the horizontal and MRS = ∞ along the vertical and at the kink point. So if R>C we're on the horizontal segment of an IDC and MRS = 0. (Likewise, if $R \le C$, MRS = ∞).

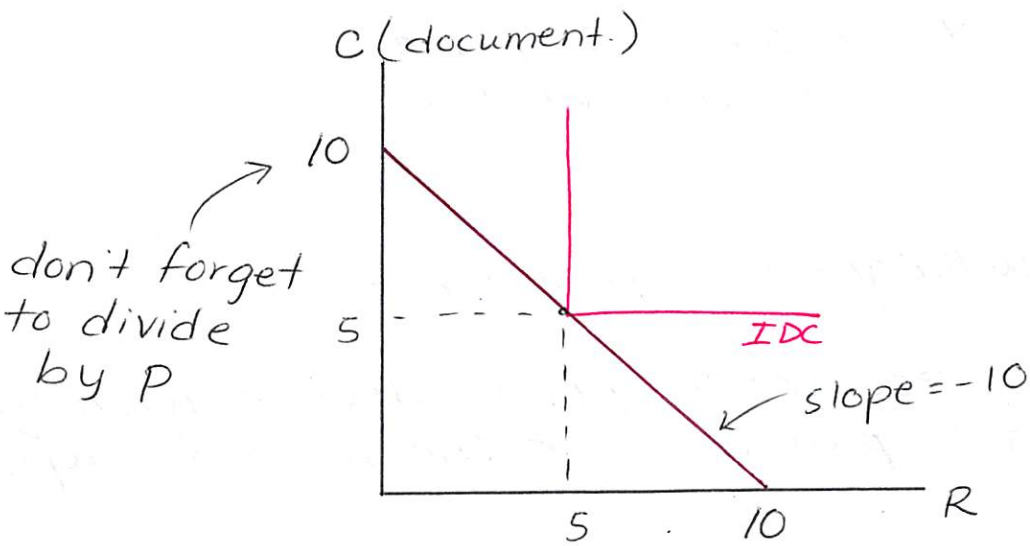
$R = \bar{L} = 10 \qquad C = M = 0 \qquad 10 > 0$ so $R > C$

The MRS = 0, so the reservation wage is $\boxed{\$0!}$

B.C.: $pC + wR = M + w\bar{L} \longrightarrow 10 \cdot C + 10 \cdot R = 10 \cdot 10$

1. Set inside equal $R = C$
2. Plug into B.C. $pC + wC = M + w\bar{L}$
   $C(p+w) = M + w\bar{L}$
   $C^* = R^* = \dfrac{M + w\bar{L}}{p+w} = \dfrac{100}{20} = 5$
3. $\bar{L} = L + R \qquad 10 = L + 5$
   $\boxed{L^* = 5}$

She'll watch 5 documentaries and work 5 hours.



7. ii. Reservation Wage:

$R = \bar{L} = 10 \quad C = \frac{M}{P} = \frac{100}{10} = 10$ $\quad R = C$ so $MRS = \infty$

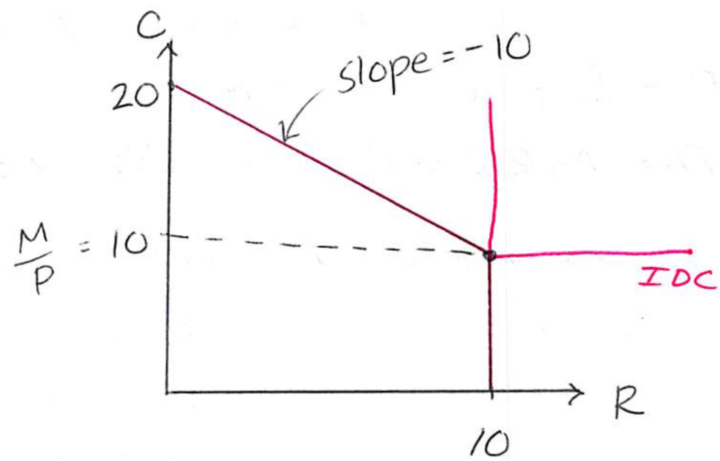
reservation wage $= \infty$ will not work for <u>any</u> wage!

We know the wage in the market is not high enough for her to work! $R^* = C^* = 10 \quad L^* = 0$.

An increase in M is a pure income effect! (There was no change in w or p so there is no SE).

	R	C	L	
SE	0	0	0	
IE	+5	+5	-5	M↑
TE	+5	+5	-5	

always opposite!



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8. From Consumer Surplus lecture slides, if we have a <u>quasi-linear DMRS</u> utility function of the form $U(x,y) = f(x) + y$, then the reservation price for the n^{th} good is $r_n = f(n) - f(n-1)$.

$U(B,Y) = \underbrace{10\sqrt{B}}_{f(B)} + Y$ reservation price of first unit: $r_1 = f(1) - f(0)$

$= 10\sqrt{1} - 10\sqrt{0}$

$= 10$

maximum willingness to pay for first cap is \$10.

Since $f'' < 0$, reservation prices decline with quantity. He is willing to pay less for the second cap.

$\boxed{B.}$