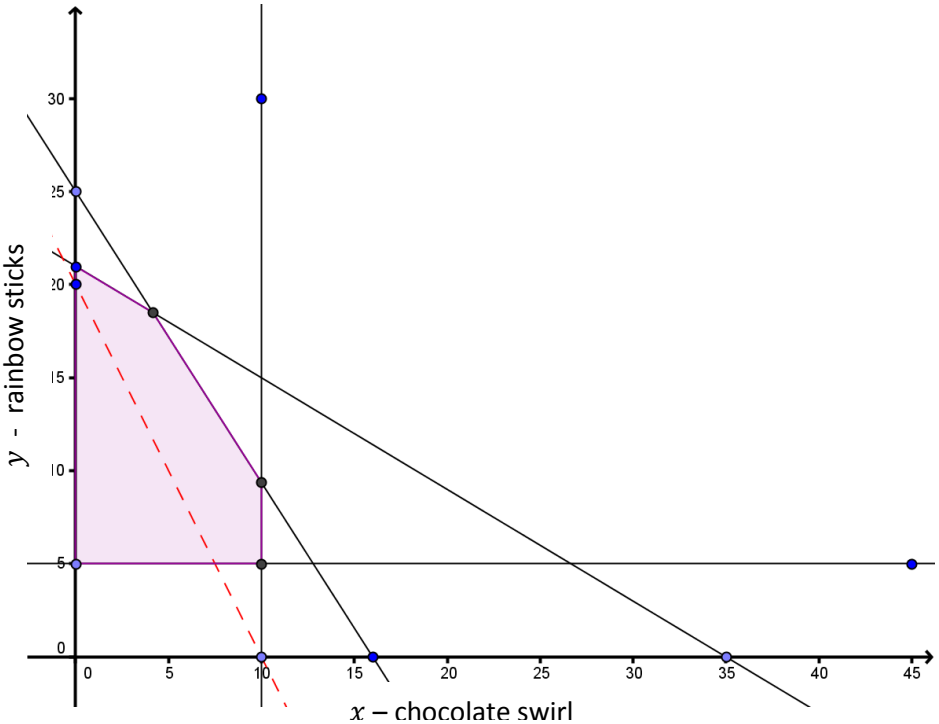
SHARP

Worksheet 7 – Memo – Linear Programming

1. a) Chocolate swirl $= x$
Rainbow stick $= y$

$25x + 5y \leq 400$ $\quad\quad$ $y \geq 5$
$x \leq 10$ $\quad\quad$ $15x + 25y \leq 525$

b)



c) $P = 3.20x + 1.60y$
$\therefore 1.6y = P - 3.2x$
$\therefore y = \frac{P}{1.6} - \frac{3.2}{1.6}x$
$\therefore y = \frac{P}{1.6} - 2x$

$\therefore$ Maximum Profit $= 3.20\ (10) + 1.60\ (10)$
$= 48$

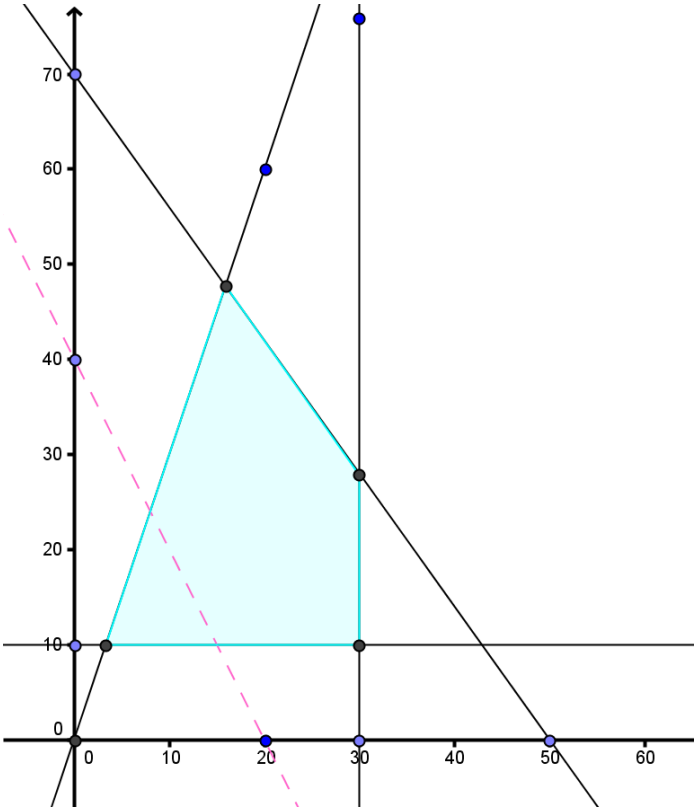
2. a) Robert $= x$

T-bot $= y$

$5y + 7x \leq 350$ $\qquad$ $3x \leq y$

$y \geq 10$ $\qquad$ $x \leq 30$

b)



c) $P = 6.40x + 3.20y$

$\therefore y = \frac{P}{3.2} - \frac{6.4}{3.2}x$

$\therefore y = \frac{p}{3.2} - 2x$ $\qquad$ $\therefore$ Profit Point at (30; 28)

$P = 6.4(30) + 3.2(28)$

$\therefore P = 281.60$

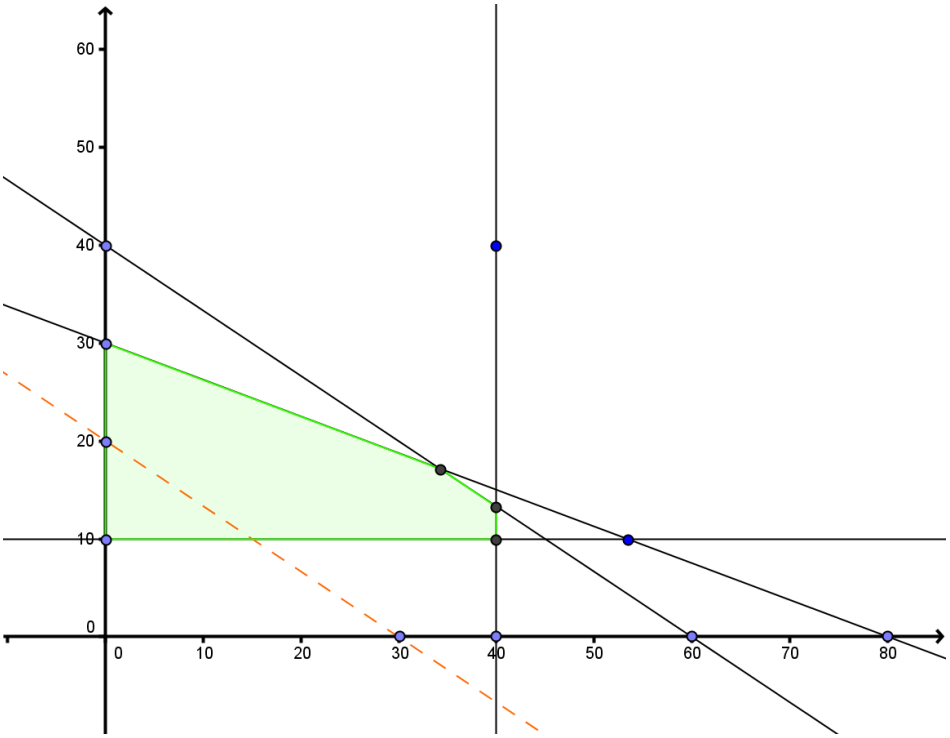
3. a) Type A $= x$

Type B $= y$

$45y + 30x \leq 1\,800$ $\qquad$ $x \leq 40$

$3x + 8y \leq 240$ $\qquad$ $y \geq 10$

b)



c) $P = 14\,000x + 21\,000y$

$\therefore y = \frac{P}{21000} - \frac{14000}{21000}x$

$\therefore y = \frac{P}{21000} - \frac{2}{3}x$ $\therefore$ Point at (34; 17) or(40; 13)

$\therefore P = 14000(34) + 21000(17)$

$\therefore P = 833\,000$

$\therefore P = 14000(40) + 21000(13)$

$\therefore P = 833\,000$

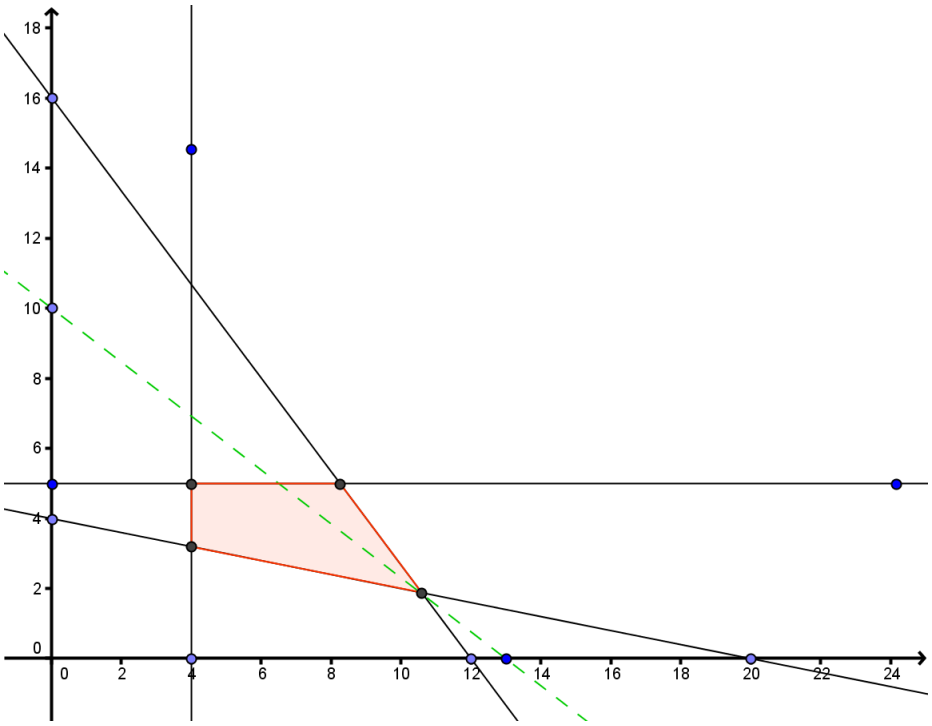
4. a) Almonds $= x$

Cashews $= y$

$3x + 4y \leq 48$ $x \geq 4$

$1x + 5y \geq 20$ $y \leq 5$

b)



c) $Cost = 130y + 100x$

$\therefore y = \frac{C}{130} - \frac{100}{130}x$

$\therefore y = \frac{C}{130} - \frac{10}{13}x$

$\therefore$ Minimum Point at (4; 3.2)

$\therefore$ Cost = 130(4) + 100(3.2)

= R840

5. a) $\frac{3}{5}x \geq y \quad \rightarrow \quad 3x \geq 5y$

$y = mx + c \rightarrow \quad y = \frac{-25}{30}x + 25 \quad \rightarrow \quad 30y + 25x \leq 750$

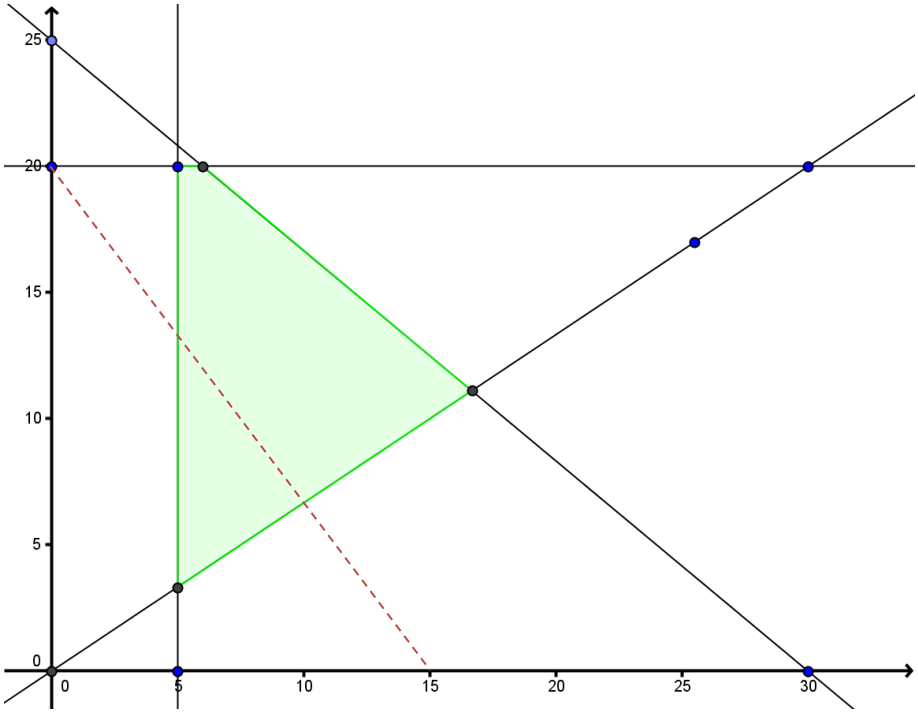
$x \geq 5$

$y \leq 20$

b) $P = 16x + 12y$

c) $\therefore y = \frac{P}{12} - \frac{16}{12}x$

$\therefore y = \frac{P}{12} - \frac{4}{3}x$



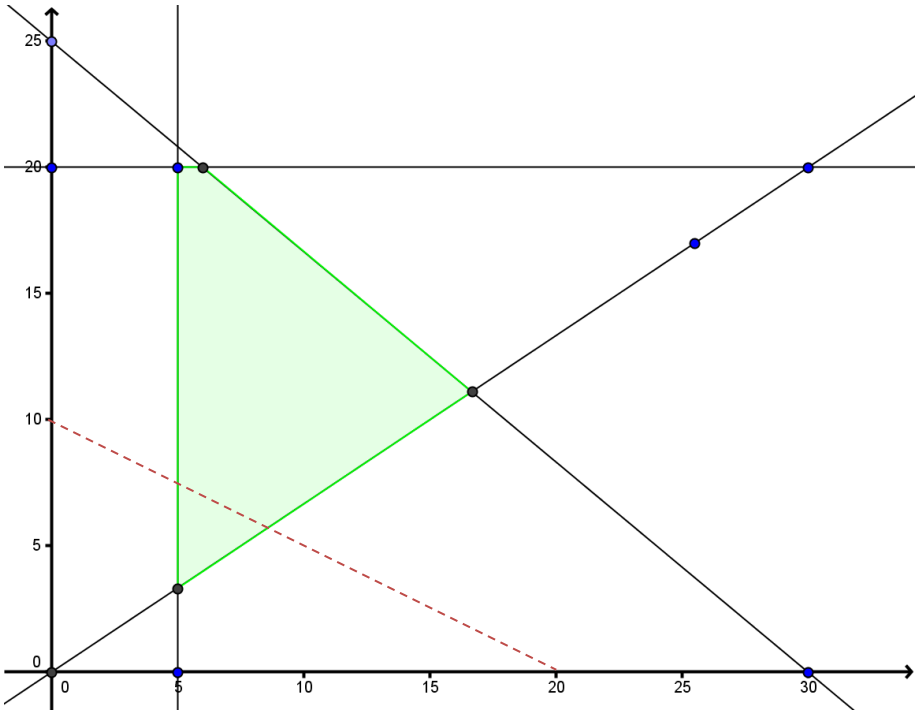
Maximum Point at (17; 11)

$\therefore P = 16(17) + 12(11)$

$\therefore P = 404$

d) i) $P = 8x + 16\,y$

ii) $\therefore y = \frac{P}{16} - \frac{8}{16}x$



∴ New maximum point at (6; 20)

∴ Yes the profit will be affected as there is a new maximum profit point.

$\therefore New\ P = 8(6) + 16(20)$
$\therefore New\ P = 368$