

Chapter Two - Trigonometry

don't forget online quiz too

Questions pages 124-127

1, 5, 6, 7, 8, 11, 13, 15, 17, 18, 20, 21, 22, 23 ... practice test 4, 5,

$$1a) \tan D = \frac{\text{opp}}{\text{adj}}$$

$$\tan D = \frac{7}{10}$$

$$\angle D = \tan^{-1}\left(\frac{7}{10}\right)$$

$$\angle D = 35^\circ \checkmark$$

$$b) \tan H = \frac{\text{opp}}{\text{adj}}$$

$$\tan H = \frac{3.2}{1.5}$$

$$\angle H = \tan^{-1}\left(\frac{3.2}{1.5}\right)$$

$$\angle H = 65^\circ \checkmark$$

$$5. i) \tan K = \frac{\text{opp}}{\text{adj}}$$

$$\tan 63^\circ = \frac{k}{1.9}$$

$$k = 1.9 (\tan 63^\circ)$$

$$k = 3.7 \text{ cm} \checkmark$$

$$ii) \tan N = \frac{\text{opp}}{\text{adj}}$$

$$\tan 42^\circ = \frac{2.7}{p}$$

$$p (\tan 42^\circ) = 2.7$$

$$p = 3.0 \text{ cm} \checkmark$$

(i)

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

$$1.9^2 + 3.7^2 = c^2$$

$$17.3 = c^2$$

$$\sqrt{17.3} = c$$

$$\approx 4.2 = c \checkmark$$

(ii)

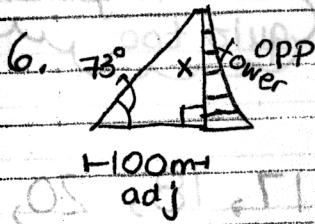
$$a^2 + b^2 = c^2$$

$$2.7^2 + 3.0^2 = c^2$$

$$16.29 = c^2$$

$$4.0 = c \checkmark$$

* We could also use cosine ratios (i) or sine ratio (ii) to solve.



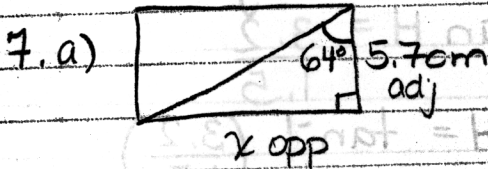
$$\tan x = \frac{\text{opp}}{\text{adj}}$$

$$\tan 73^\circ = \frac{x}{100}$$

$$x = 100(\tan 73^\circ)$$

$$x = 327 \text{ m} \checkmark$$

The tower is 327 m.

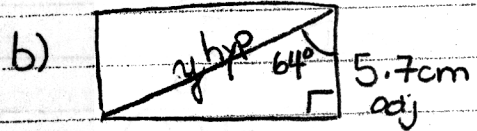


$$\tan 64^\circ = \frac{x}{5.7}$$

$$x = 5.7(\tan 64^\circ)$$

$$x = 11.7 \text{ cm} \checkmark$$

The length is 11.7 cm.

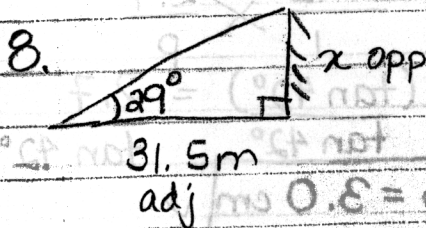


$$\cos 64^\circ = \frac{5.7}{y}$$

$$y(\cos 64^\circ) = 5.7$$

$$y = 13.0 \text{ cm} \checkmark$$

The diagonal is 13.0 cm.

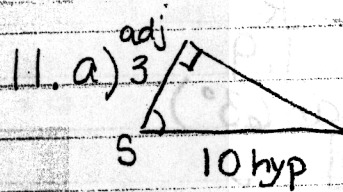


$$\tan 29^\circ = \frac{x}{31.5}$$

$$x = 31.5(\tan 29^\circ)$$

$$x = 17.5 \text{ m} \checkmark$$

The tree is ~17.5 m.



$$\cos S = \frac{\text{adj}}{\text{hyp}}$$

$$\cos S = \frac{3}{10}$$

$$\angle S = \cos^{-1}\left(\frac{3}{10}\right)$$

$$\angle S = 73^\circ \checkmark$$

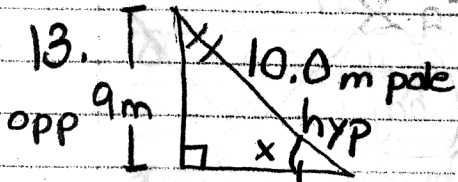


$$\sin U = \frac{\text{opp}}{\text{hyp}}$$

$$\sin U = \frac{3.7}{8}$$

$$\angle U = \sin^{-1}\left(\frac{3.7}{8}\right)$$

$$\angle U = 28^\circ \checkmark$$



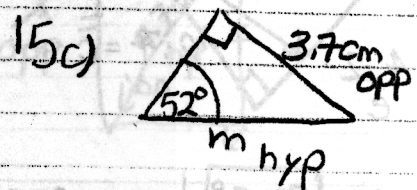
angle of inclination

$$\sin X = \frac{\text{opp}}{\text{hyp}}$$

$$\sin X = \frac{9}{10}$$

$$\angle X = \sin^{-1}\left(\frac{9}{10}\right)$$

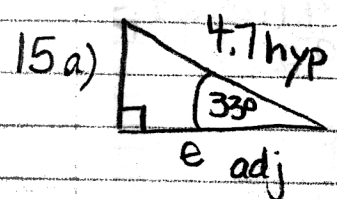
$$\angle X = 64.2^\circ \checkmark$$



$$\sin 52^\circ = \frac{3.7}{m}$$

$$m = \frac{3.7}{\sin 52^\circ}$$

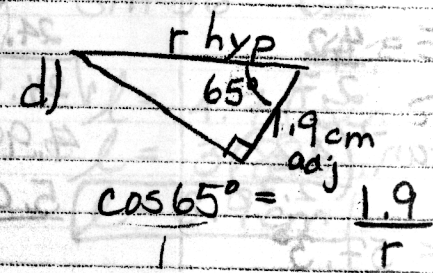
$$m = 4.7 \text{ cm} \checkmark$$



$$\cos 33^\circ = \frac{e}{4.7}$$

$$e = 4.7 (\cos 33^\circ)$$

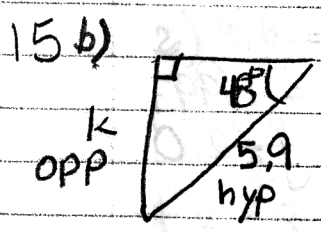
$$e = 3.9 \text{ cm} \checkmark$$



$$\cos 65^\circ = \frac{1.9}{r}$$

$$r = \frac{1.9}{\cos 65^\circ}$$

$$r = 4.5 \text{ cm} \checkmark$$



$$\sin 48^\circ = \frac{k}{5.9}$$

$$k = 5.9 (\sin 48^\circ)$$

$$k = 4.4 \text{ cm} \checkmark$$

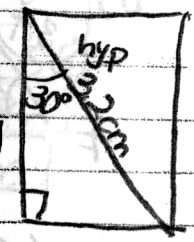
17.



$$\sin 30^\circ = \frac{x}{3.2}$$

$$x = 3.2 (\sin 30^\circ)$$

$$x = 1.6 \text{ cm}$$

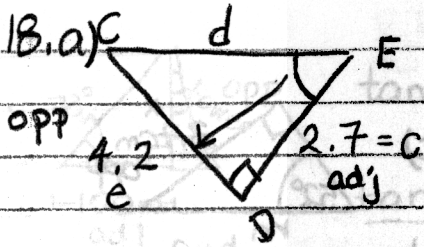


$$\cos 30^\circ = \frac{y}{3.2}$$

$$y = 3.2 (\cos 30^\circ)$$

$$y = 2.8 \text{ cm}$$

the dimensions are: 1.6 cm by 2.8 cm



$\angle C = 32.7^\circ$
 $\angle D = 90^\circ$
 $\angle E = 57.3^\circ$

$c = 2.7$
 $d = 5.0$
 $e = 4.2$

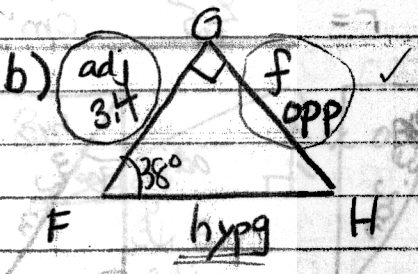
$\tan E = \frac{\text{opp}}{\text{adj}}$
 $\tan E = \frac{4.2}{2.7}$

$a^2 + b^2 = c^2$
 $2.7^2 + 4.2^2 = c^2$
 $24.93 = c^2$
 $\sqrt{24.93} = c$
 $4.99 = c$
 $5.0 = c$

$\angle E = \tan^{-1}\left(\frac{4.2}{2.7}\right)$

$\angle E = 57.3^\circ$

$\angle C = 180^\circ - 90^\circ - 57.3^\circ = 32.7^\circ$



$\angle G = 90^\circ$
 $\angle F = 38^\circ$
 $\angle H = 52^\circ$

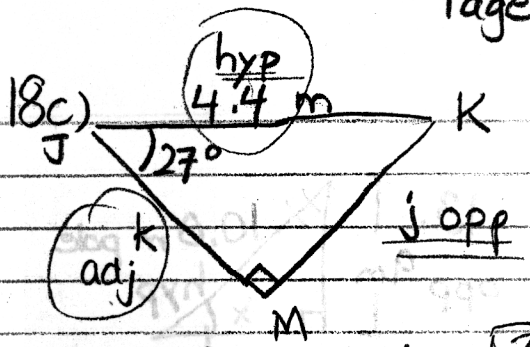
$g = 4.3 \text{ cm}$
 $f = 2.7 \text{ cm}$
 $h = 3.4 \text{ cm}$

To find f:

$\tan 38^\circ = \frac{f}{3.4}$
 $f = 3.4(\tan 38^\circ)$
 $f = 2.656...$

To find g: $\cos 38^\circ = \frac{3.4}{g}$

$g \cdot \cos 38^\circ = 3.4$
 $g = \frac{3.4}{\cos 38^\circ}$
 $g = 4.314...$



$\angle J = 27^\circ$
 $\angle K = 63^\circ$
 $\angle M = 90^\circ$

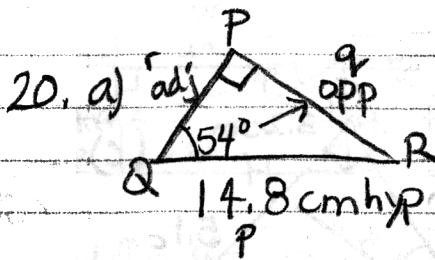
$j = 2.0 \text{ m}$
 $k = 3.9 \text{ m}$
 $m = 4.4 \text{ m}$

To find k:

$\cos 27^\circ = \frac{k}{4.4}$
 $k = 4.4(\cos 27^\circ)$
 $k = 3.92...$

To find j:

$\sin 27^\circ = \frac{j}{4.4}$
 $j = 4.4(\sin 27^\circ)$
 $j = 1.997558...$
 $j = 2.0 \text{ m}$



Perimeter - Sum of Sides

$$\text{Area}_{\Delta} = \frac{bh}{2}$$

1. Find r : $\cos 54^{\circ} = \frac{r}{14.8}$

$$r = 14.8 (\cos 54^{\circ})$$

$$r = 8.699\dots$$

$$\boxed{r = 8.7 \text{ cm}}$$

2. Find q : $\sin 54^{\circ} = \frac{q}{14.8}$

$$q = 14.8 (\sin 54^{\circ})$$

$$q = 11.97\dots$$

$$\boxed{q = 12.0 \text{ cm}}$$

$$\text{Perimeter} = S_1 + S_2 + S_3$$

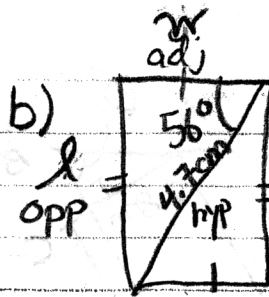
$$P = 14.8 + 12.0 + 8.7$$

$$\boxed{P = 35.5 \text{ cm}} \checkmark$$

$$A = \frac{bh}{2}$$

$$A = \frac{(8.7)(12)}{2}$$

$$\boxed{A = 52.2 \text{ cm}^2} \checkmark$$



$$P = S.O.S.$$

$$A = lw$$

1. Find length (l).

$$\sin 56^{\circ} = \frac{l}{4.7}$$

$$l = 4.7 (\sin 56^{\circ})$$

$$l = 3.896\dots$$

$$\boxed{l = 3.9 \text{ cm}}$$

2. Find width (w).

$$\cos 56^{\circ} = \frac{w}{4.7}$$

$$w = 4.7 (\cos 56^{\circ})$$

$$w = 2.628\dots$$

$$\boxed{w = 2.6 \text{ cm}}$$

$$P = S_1 + S_2 + S_3 + S_4$$

$$P = 2.6 + 2.6 + 3.9 + 3.9$$

$$\boxed{P = 13.0 \text{ cm}} \checkmark$$

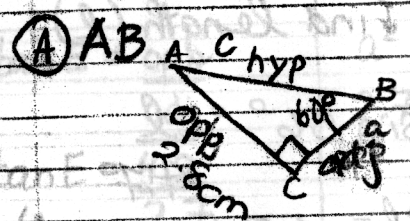
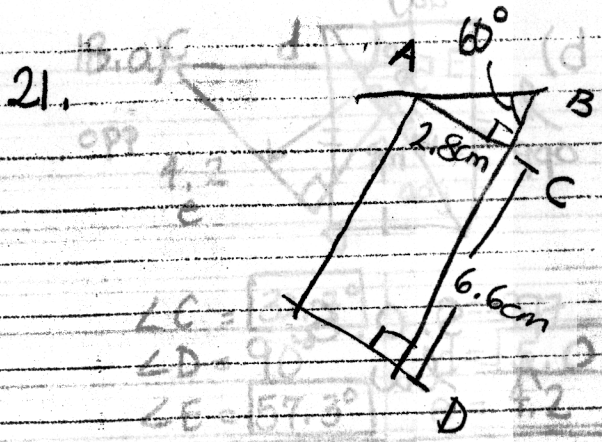
$$A = lw$$

$$A = (3.9)(2.6)$$

$$\boxed{A = 10.14 \text{ cm}^2}$$

$$\boxed{A = 10.1 \text{ cm}^2} \checkmark \text{ - nearest tenth.}$$

(10.2 cm² if you don't round)



$$\sin 60^\circ = \frac{2.8}{c}$$

$$c \left(\frac{\sin 60^\circ}{\sin 60^\circ} \right) = \frac{2.8}{\sin 60^\circ}$$

$$c = \frac{2.8}{\sin 60^\circ}$$

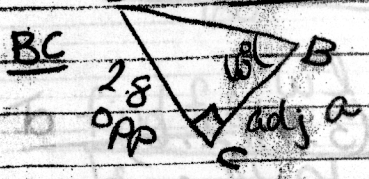
$$c = 3.2 \text{ cm}$$

$$\boxed{AB = c = 3.2 \text{ cm}}$$

★ ② To find BD

$$BD = CD + BC$$

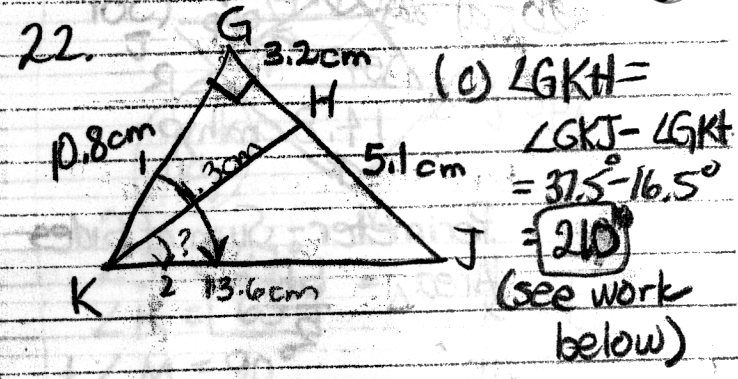
$$BD = 6.6 + 1.6 = \boxed{8.2 \text{ cm}}$$



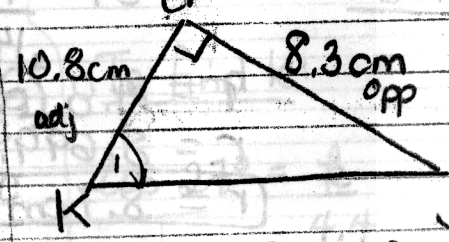
$$\tan 60^\circ = \frac{2.8}{a}$$

$$a = \frac{2.8}{\tan 60^\circ}$$

$$\boxed{a = 1.6 \text{ cm}}$$



BIG Triangle ΔGJK



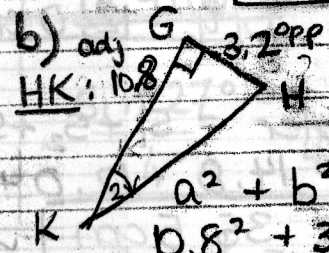
a) $KJ: a^2 + b^2 = c^2$

$$10.8^2 + 8.3^2 = c^2$$

$$185.53 = c^2$$

$$\sqrt{185.53} = c$$

$$\boxed{13.6 \text{ cm} = c} \checkmark$$



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

$$0.8^2 + 3.2^2 = c^2$$

$$126.88 = c^2$$

$$\sqrt{126.88} = c$$

$$\boxed{11.3 \text{ cm} = c} \checkmark$$

① $\Delta GJK \Rightarrow \tan K = \frac{8.3}{10.8}$

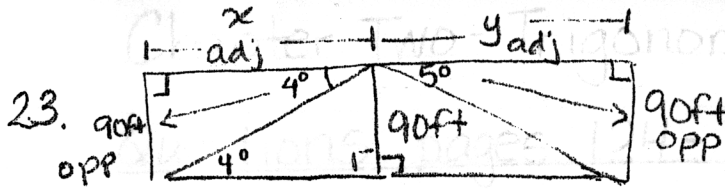
$$\angle GJK = \tan^{-1} \left(\frac{8.3}{10.8} \right)$$

$$\angle GJK = 37.5^\circ$$

② $\Delta GKH \Rightarrow \tan K = \frac{3.2}{10.8}$

$$\angle GKH = \tan^{-1} \left(\frac{3.2}{10.8} \right) = 16.5^\circ$$

don't forget onli quiz too



$$\tan 4^\circ = \frac{90}{x}$$

$$x = \frac{90}{\tan 4^\circ}$$

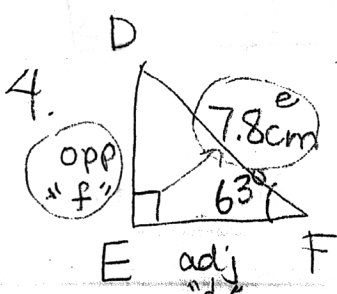
$$x = 1287.1$$

$$\tan 5^\circ = \frac{90}{y}$$

$$y = \frac{90}{\tan 5^\circ}$$

$$y = 1028.7$$

The total distance is : $1287.1 + 1028.7 = 2315.8 \approx 2316 \text{ m}$ ✓



$$d = 6.9 \text{ cm}$$

$$e = 7.8 \text{ cm}$$

$$f = 3.5 \text{ cm}$$

$$\angle D = 27^\circ$$

$$\angle E = 90^\circ$$

$$+ \angle F = 63^\circ$$

$$\hline 180^\circ$$

To find f:

$$\sin F = \frac{\text{opp}}{\text{hyp}}$$

$$\sin 63^\circ = \frac{f}{7.8}$$

$$f = 7.8 (\sin 63^\circ)$$

$$f = DE = 6.9 \text{ cm}$$

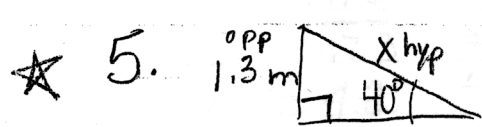
To find d:

$$\cos F = \frac{\text{adj}}{\text{hyp}}$$

$$\cos 63^\circ = \frac{d}{7.8}$$

$$d = 7.8 (\cos 63^\circ)$$

$$d = 3.5 \text{ cm}$$



The shortest possible length is 202 cm.

$$\sin 40^\circ = \frac{1.3}{x}$$

$$x \cdot \sin 40^\circ = 1.3$$

$$x = \frac{1.3}{\sin 40^\circ} = 202 \text{ m} = 202 \text{ cm}$$

To find x:

To find y:

6. $\tan 20^\circ = \frac{x}{40}$

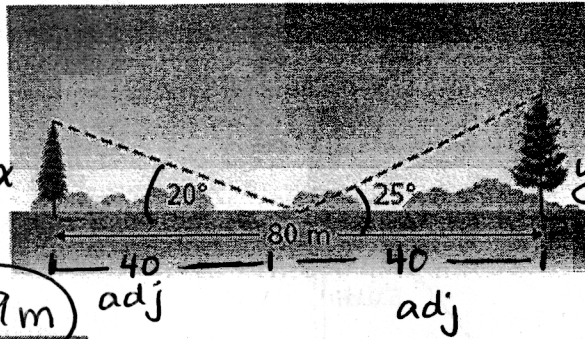
$\tan 25^\circ = \frac{y}{40}$

$x = 40(\tan 20^\circ)$

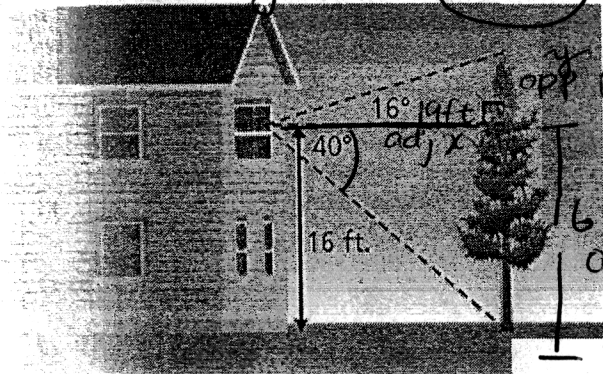
$x = 14.6 \approx 15m$

$y = 40(\tan 25^\circ)$

$y = 18.6 \approx 19m$



8.



① $\tan 40^\circ = \frac{16}{x}$
 $x = \frac{16}{\tan 40^\circ}$
 $x = 19ft$

② $\tan 16^\circ = \frac{y}{19}$
 $y = 19(\tan 16^\circ)$
 $y = 5.46$

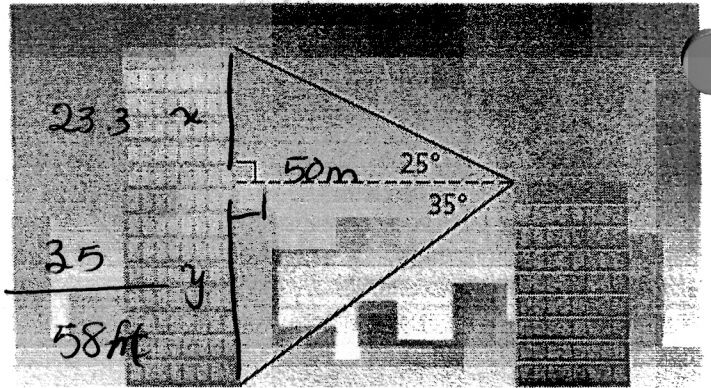
∴ tree is $16ft + 5.46ft = 21ft$

9.

$\tan 25^\circ = \frac{x}{50}$

$x = 50(\tan 25^\circ)$

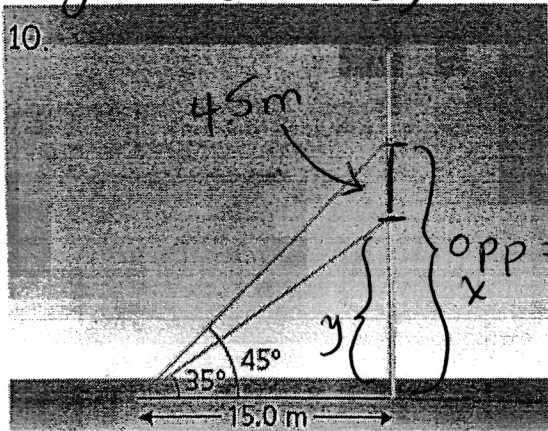
$x = 23.3m$



∴ taller building is 58m.

$\tan 35^\circ = \frac{y}{50}$

$y = 50(\tan 35^\circ) = 35m$



①

② $\tan 45^\circ = \frac{opp}{15}$

$opp = 15 \cdot \tan 45^\circ$
 $opp = 15m$

②

③

$15m - 10.5m = 4.5m$

$\tan 35^\circ = \frac{y}{15}$

$y = 15(\tan 35^\circ) = 10.5m$