868 TUTORS

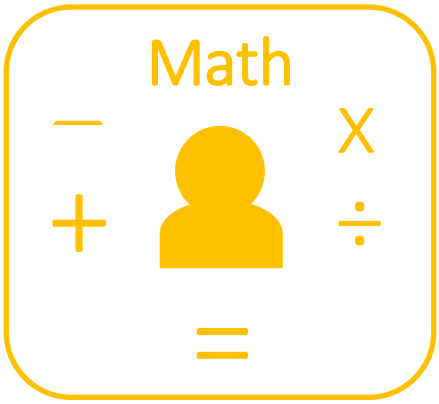
Preparation for

High School Mathematics

Trigonometry

(Right angled triangles)

Solutions



Instructions and Tips:

- ✓ **You have 75 minutes to complete this worksheet**
- ✓ **This worksheet consists of 6 questions**
- ✓ **Write answers in the spaces provided**
- ✓ **All working must be clearly shown**

Student Name: _____

Student ID: _____

Date: _ _ / _ _ / _ _ _ _

Total Score:

Highest Score:

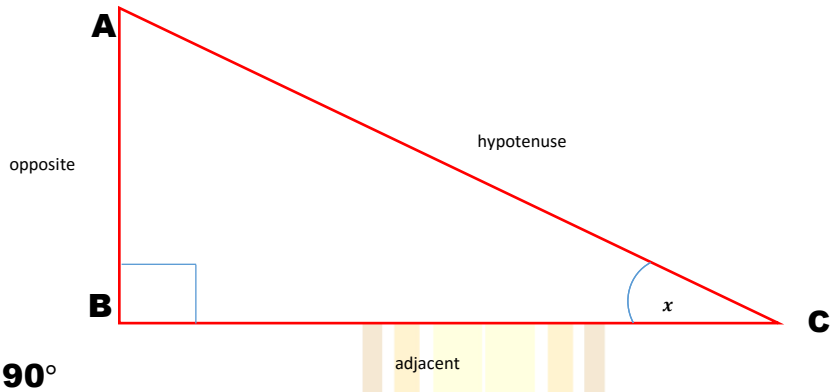
Tutor's Comments:

Access more free worksheets at www.868tutors.com

Question 1

Each right-angled triangle below has an 'angle of interest' indicated. This 'angle of interest' is an angle that you can be asked to solve. Using the information below, label the right angle, the 'angle of interest' (as x), the opposite, the adjacent and the hypotenuse sides for the following triangles.

(a)

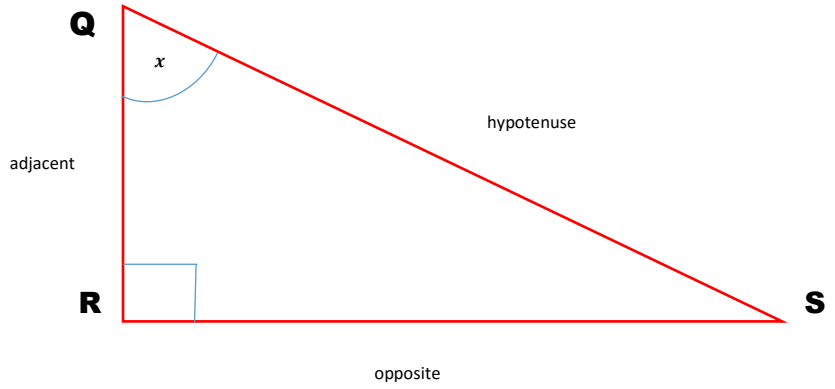


<ABC = 90°

<ACB=angle of interest

(5 marks)

(b)

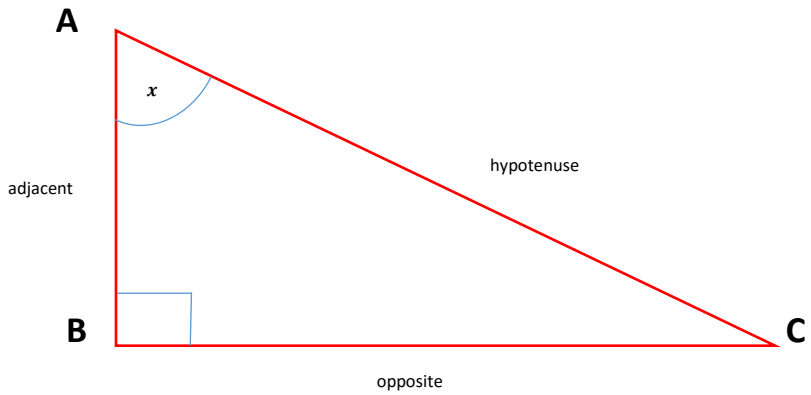


<QRS= 90°

<RQS=angle of interest

(5 marks)

(c)

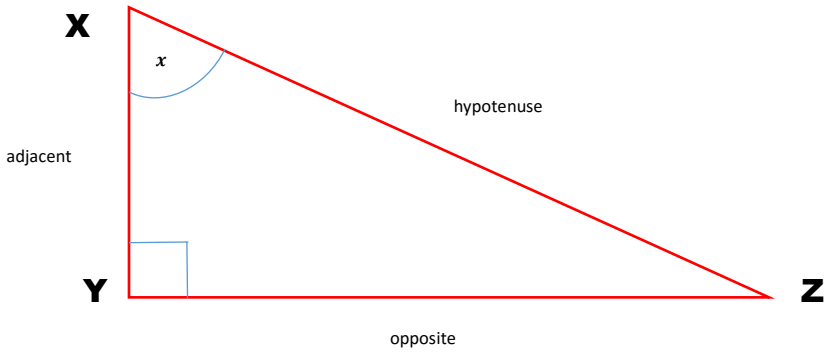


<ABC = 90°

<BAC= angle of interest

(5 marks)

(d)

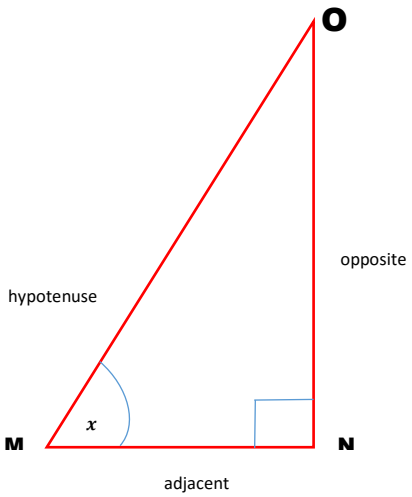


<XYZ=90°

<YXZ= angle of interest

(5 marks)

(e)

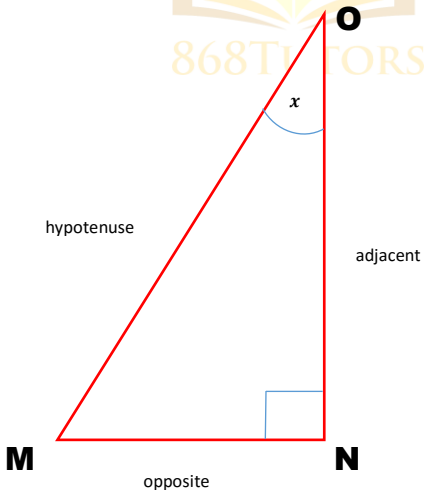


<MNO=90°

<OMN=angle of interest

(5 marks)

(f)



<MNO=90°

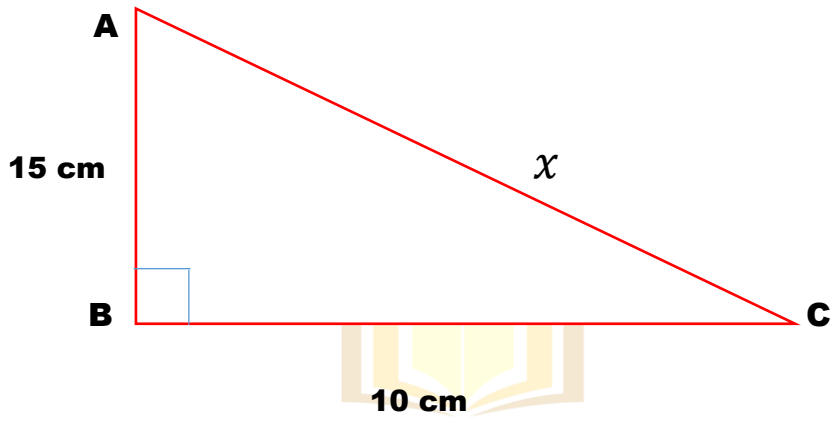
<MON=angle of interest

(5 marks)

Question 2

Pythagoras is credited with a theorem involving right angled triangles. Apply the Pythagoras theorem in the following questions to find the lengths of the unknown sides.

(a) <ABC=90°



$(AB)^2 + (BC)^2 = (AC)^2$

$(15)^2 + (10)^2 = (AC)^2$

$225 + 100 = (AC)^2$

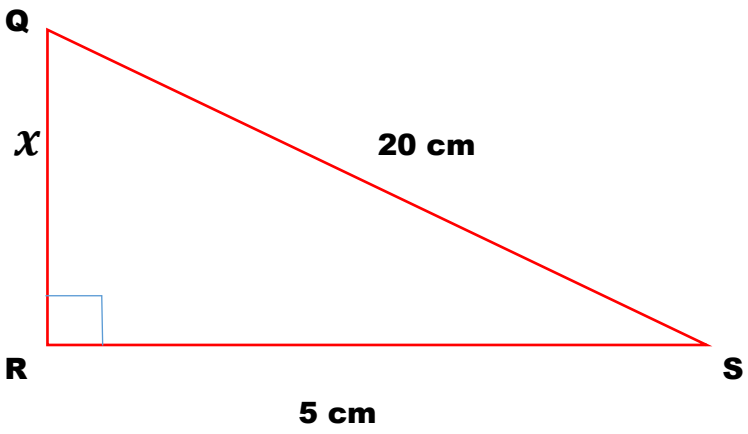
$(AC)^2 = 225 + 100$

$(AC)^2 = 325$

AC = 18.03 cm (to 2 decimal places)

(3 marks)

(b) <QRS=90°



$(QR)^2 + (RS)^2 = (QS)^2$

$(QR)^2 = (QS)^2 - (RS)^2$

$(QR)^2 = (20)^2 - (5)^2$

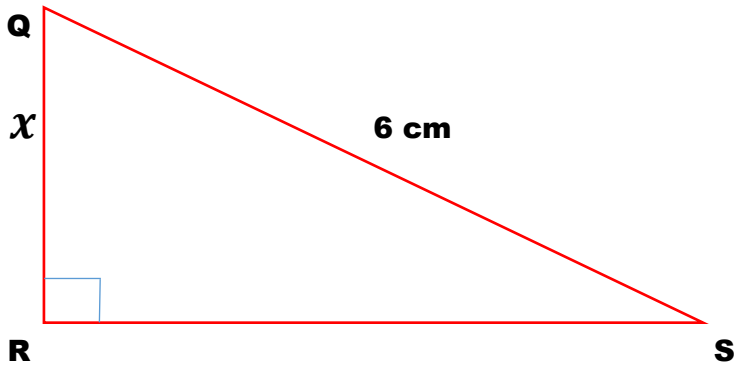
$(QR)^2 = 400-25$

$(QR)^2 = 375$

QR = 19.36 cm (to 2 decimal places)

(3 marks)

(c) <QRS=90°



$(QR)^2 + (RS)^2 = (QS)^2$

$(QR)^2 = (QS)^2 - (RS)^2$

$(QR)^2 = (6)^2 - (4)^2$

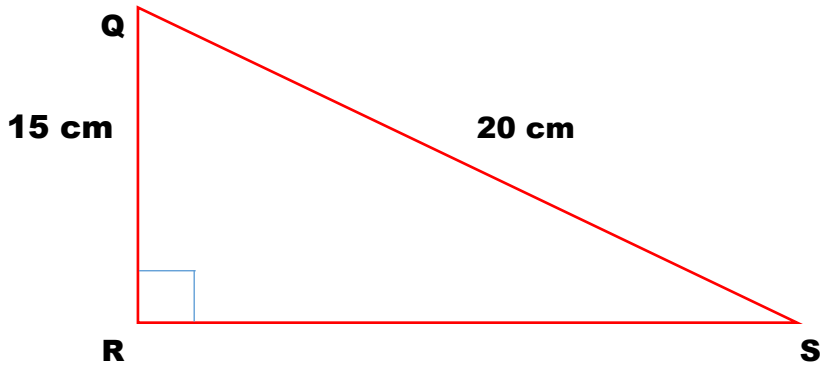
$(QR)^2 = 36 - 16$

$(QR)^2 = 20$

QR = 4.47 cm (to 2 decimal places)

(3 marks)

(d) <QRS=90°



x

$(QR)^2 + (RS)^2 = (QS)^2$

$(RS)^2 = (QS)^2 - (QR)^2$

$(RS)^2 = (20)^2 - (15)^2$

$(RS)^2 = 400 - 225$

$(RS)^2 = 175$

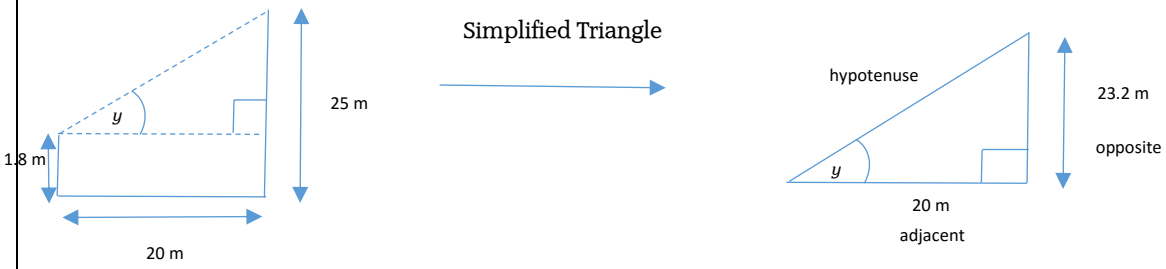
RS = 13.23 cm (to 2 decimal places)

(3 marks)

Question 3 **(Angle of Elevation and Angle of Depression)**

For each question below, draw the appropriate right angled triangle.

Junior Addams is 1.8m tall. He stands 20 meters away from his local television antenna. The antenna is 25 meters high. What is the angle of elevation of the top of the antenna from his eyes?



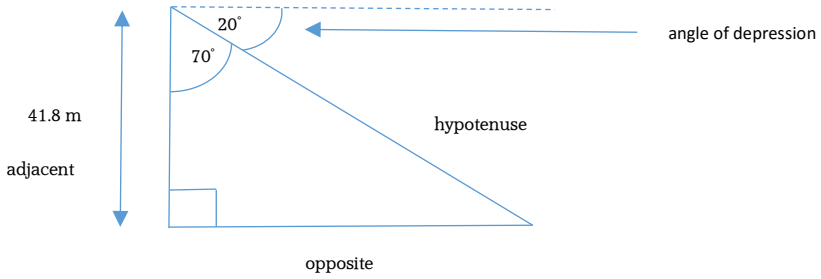
$\tan y = \frac{\text{opposite}}{\text{adjacent}}$ $\tan y = \frac{23.2\text{ m}}{20\text{ m}}$ $\tan y = 1.16$ $y = \tan^{-1}(1.16)$ $y = 49.24^\circ$

angle of elevation of the top of the antenna from his eyes = 49.24° (to 2 decimal places)

(3 marks)

Question 4

A farmer in Los Iros enjoys the scenic view from the top of a cliff that is 40 m high. The farmer is 1.8 m tall and he is standing. He observes a personal watercraft that has stalled in the ocean. The angle of depression is 20°. If he is line with the watercraft, calculate the distance between the watercraft and the farmer.



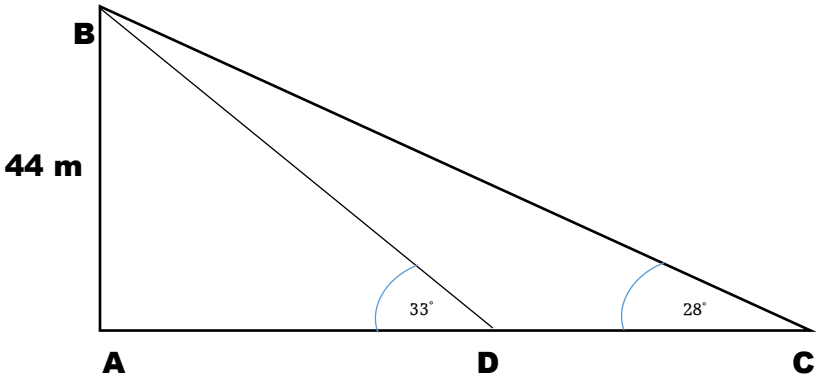
$\cos y = \frac{\text{adjacent}}{\text{hypotenuse}}$ $\cos 70^\circ = \frac{41.8}{\text{hypotenuse}}$ $\text{hyp} \times \cos 70^\circ = 41.8\text{ m}$ $\text{hyp} = \frac{41.8}{\cos 70^\circ}$ **hyp = 122.22 m**

distance between the watercraft and farmer = 122.22 m (to 2 decimal places)

(3 marks)

Question 5

The diagram below is a simplified diagram of a possible scenario. In the diagram, AB represents a radio tower that is vertical. The radio tower rests on a horizontal plane and A, D and C are points on the horizontal plane.



AB = 44 m

The angles of elevation of the top of the tower B from D and C are 33° and 28° respectively

(a) Indicate on the diagram above the relevant angles of elevation

(2 marks)

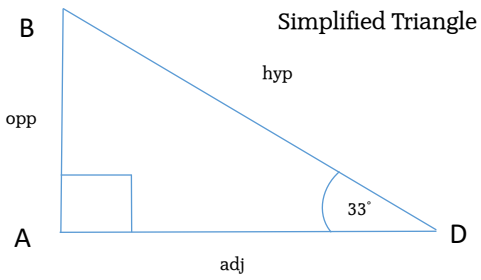
Determine

(b) the length of AD

let angle ADB = y $\tan y = \frac{\text{opposite}}{\text{adjacent}}$ $\tan y = \frac{44\text{ m}}{\text{adjacent}}$ $\tan 33^\circ = \frac{44\text{ m}}{\text{adjacent}}$ $\text{adj} \times \tan 33^\circ = 44\text{m}$ $\text{adj} = \frac{44\text{ m}}{\tan 33^\circ}$

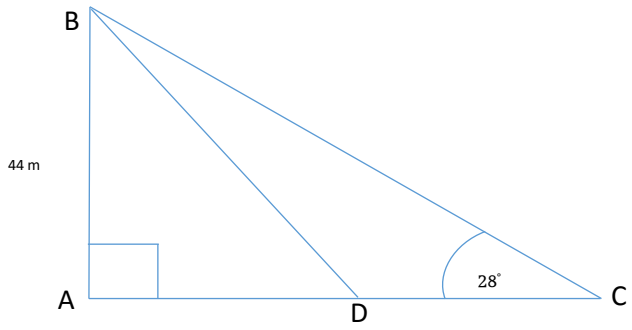
adj = 67.75 m

length of AD = 67.75 m (to 2 decimal places)



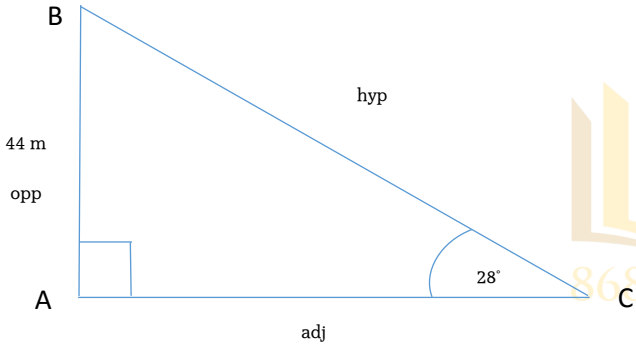
(3 marks)

(c) the length of DC



Length of DC = Length of AC – Length of AD

Firstly, Determine the length of AC



Let angle ACB = y

$\tan y = \frac{\text{opposite}}{\text{adjacent}}$

$\tan 28^\circ = \frac{44\text{ m}}{\text{adj}}$

$\text{adj} \times \tan 28^\circ = 44\text{m}$

$\text{adj} = \frac{44\text{ m}}{\tan 28^\circ}$

$\text{adj} = \frac{44\text{ m}}{\tan 28^\circ}$ adj = 82.75 m AC = 82.75 m

Length of DC = Length of AC – Length of AD

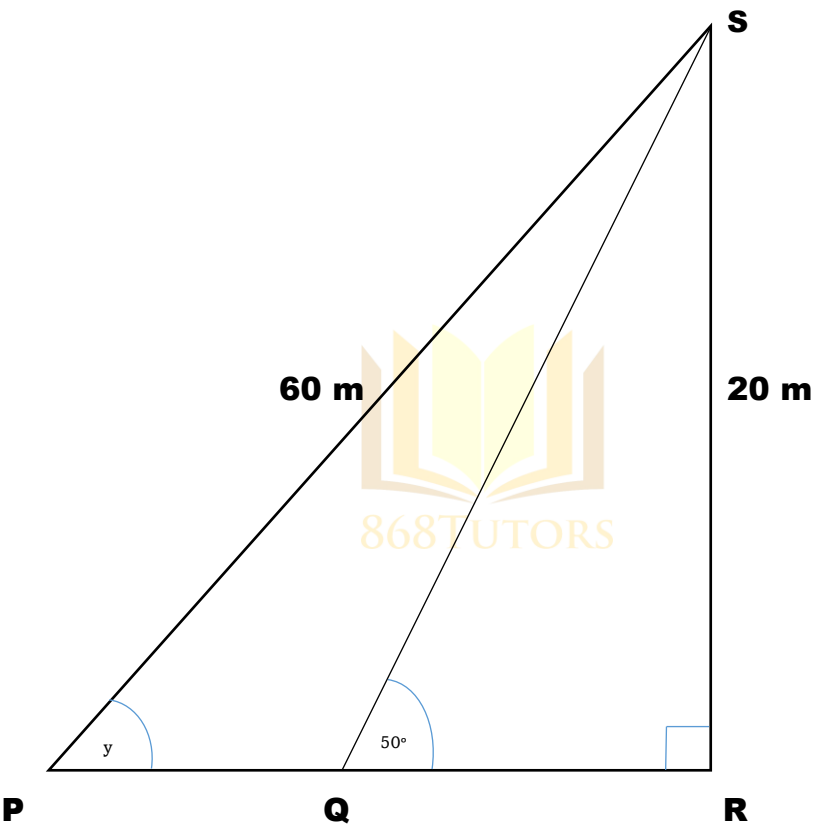
Recall length of AD = 67.75 m

length of DC = 82.75 m - 67.75 m

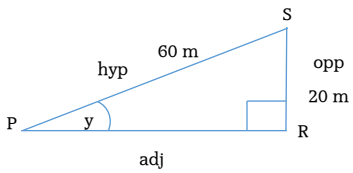
Length of DC = 15.00 m (to 2 decimal places) **(3 marks)**

Question 6

The diagram below is a simplified diagram of a possible scenario. In the diagram RS represents an oil rig. Assume that the oil rig is vertical. The oil rig rests on a horizontal plane and P, Q and R are points on the horizontal plane.



Simplified Triangle



<SQR =50°,<PRS= 90°, PS=60 m, RS=20 m

Determine, giving your answer to 2 decimal places

(a) the size of <SPR

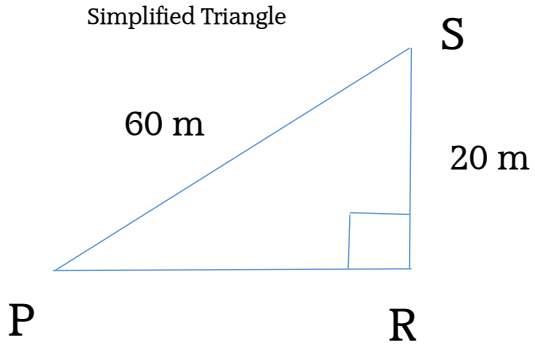
$\sin y = \frac{\text{opposite}}{\text{hypotenuse}}$ $\sin y = \frac{20\text{ m}}{60\text{ m}}$ $\sin y = \frac{1}{3}$ $y = \sin^{-1}(\frac{1}{3})$ **y = 19.47° (to 2 decimal places)**

(2 marks)

(b) the length of PQ, in cm

length of PQ = length of PR – length of QR

Determining the length of PR (using simplified triangle)



$(PR)^2 + (RS)^2 = (PS)^2$

$(PR)^2 = (PS)^2 - (RS)^2$

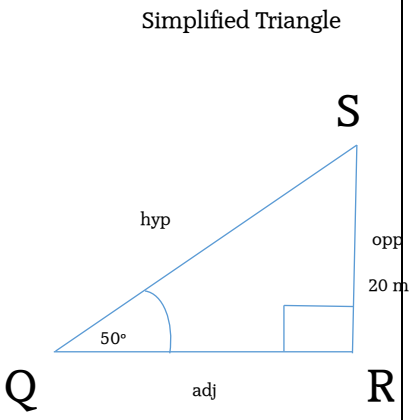
$(PR)^2 = (60)^2 - (20)^2$

$(PR)^2 = 3600 - 400$

$(PR)^2 = 3200$

PR = 56.57 m

Determining the length of QR (using simplified triangle)



let angle RQS = y

$\tan y = \frac{\text{opposite}}{\text{adjacent}}$

$\tan 50^\circ = \frac{20}{\text{adjacent}}$

$20 = \text{adj} \times \tan 50^\circ$

$\text{adj} = \frac{20}{\tan 50^\circ}$ adj = 16.78 m QR =16.78 m

length of PQ = length of PR – length of QR

length of PQ = 56.57 m – 16.78 m

length of PQ = 39.79 m (to 2 decimal places)

(5 marks)

END OF WORKSHEET