Trig test nov 2010 Practice ~~Direction Sheet~~

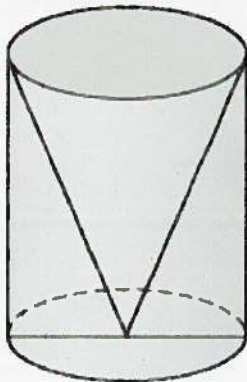**Multiple Choice**
Identify the choice that best completes the statement or answers the question.

____   1. A cone just fits inside a can. The diameter of the can is 7.6 cm and the height is 10.4 cm. Determine the angle
between the vertex of the cone and the bottom of the can, to the nearest tenth of a degree.

    a.   20.1°   c.   69.9°
    b.   40.1°   d.   139.9°

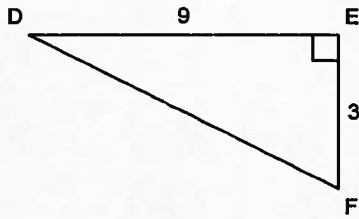____   2. Solve this right triangle. Give the measures to the nearest tenth.
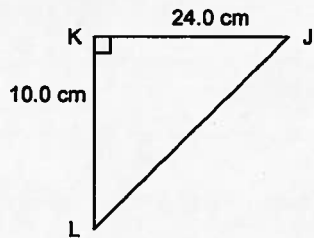
    a. $\angle J = 67.4°$; $\angle L = 22.6°$; JL = 26.0 cm   c. $\angle J = 22.6°$; $\angle L = 67.4°$; JL = 26.0 cm
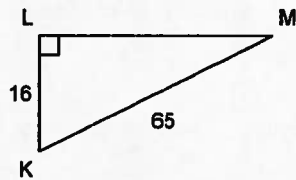   b. $\angle J = 67.4°$; $\angle L = 22.6°$; JL = 62.4 cm   d. $\angle J = 22.6°$; $\angle L = 67.4°$; JL = 62.4 cm

Short Answer
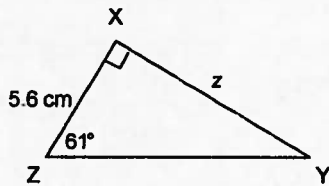
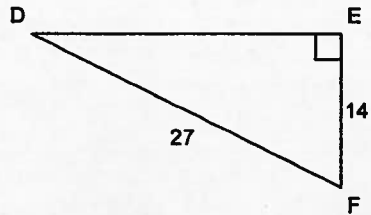3. Determine the measure of ∠D to the nearest tenth of a degree.

4. Determine the tangent ratio for ∠K.

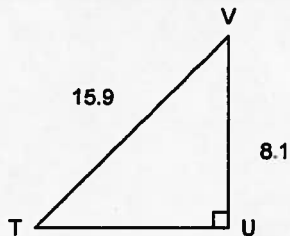5. Determine the length of side *z* to the nearest tenth of a centimetre.

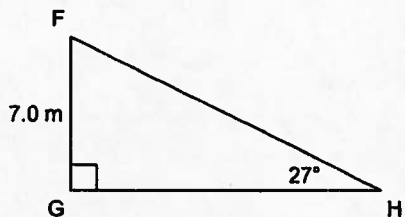6. Determine the measure of ∠D to the nearest tenth of a degree.

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D                           E
  •                         •
    •                       |
      •                     | 14
    27  •                   |
          •                 |
            •               •
                            F
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7. Determine the measure of ∠V to the nearest tenth of a degree.

```
              V
              •
        15.9 /|
            / |
           /  | 8.1
          /   |
         /    |
        •_____•
       T       U
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8. A submarine rises a vertical distance of 280 m to the surface. The distance measured along the submarine's path is 700 m. Determine the angle of inclination of the submarine's path to the nearest degree.

9. The navigator of a ship at sea sees a lighthouse due north of the ship. The ship then sails 2.7 km due west. The angle between the ship's path and the line of sight to the lighthouse is 36.1°. How far is the ship from the lighthouse to the nearest tenth of a kilometre?

10. Solve this right triangle. Give the measures to the nearest tenth.

11. Determine the length of RS to the nearest tenth of a centimetre.
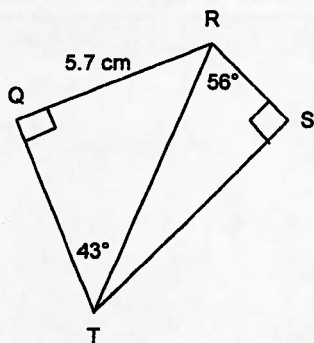
12. Calculate the measure of ∠ABC to the nearest tenth of a degree.

13. Tan B = 1.5; determine the measure of ∠B to the nearest tenth of a degree.

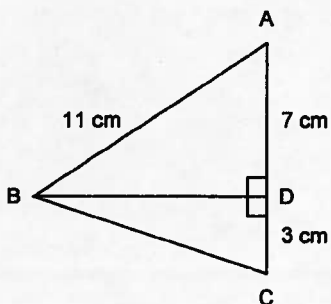14. A tree is supported by a guy wire. The guy wire is anchored to the ground 4.0 m from the base of the tree. The angle between the wire and the level ground is 63°. How far up the tree does the wire reach, to the nearest tenth of a metre?

15. A communications tower is 250 m high. Rebecca is driving toward the tower. The angle between the ground and Rebecca's line of sight to the top of the tower is 7°. About how far is Rebecca from a point on the ground vertically below the top of the tower, to the nearest hundred metres?

16. A road rises 1 m for every 9 m measured along the road. What is the angle of inclination of the road to the nearest tenth of a degree?

17. From the roof of Yee's building, the angle of elevation of the top of a taller building is 37°. The angle of depression of the base of the building is 24°. The buildings are 21 m apart. Determine the height of the taller building to the nearest metre.

18. Triangle ABC is a right triangle. Side AB is 16 cm, and side AC is 18 cm. Using trigonometry, determine the length of BC, to the nearest tenth of a centimetre.

Problem

19. Guy wires are attached to buildings as shown. A student says the angles of inclination of the wires are the same. Is the student correct? Justify your answer.
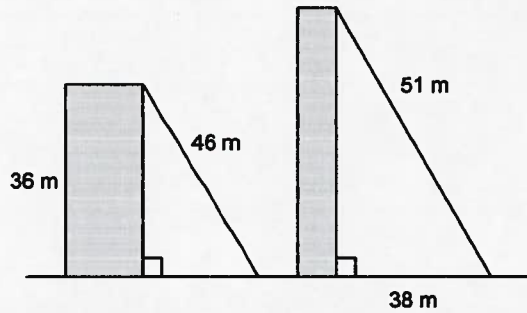
20. Determine the area of this right triangle to the nearest square metre.
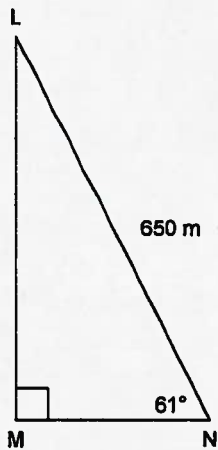
21. Solve ∆LMN. Give the measures to the nearest tenth. Explain your strategy.
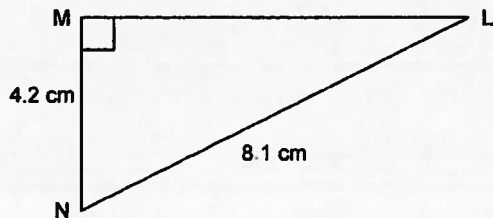
22. A cone is formed by cutting out the shape below and joining the straight edges with tape. Calculate the angle of inclination of the side of the cone to the nearest tenth of a degree.

16.5 cm

16.5 cm
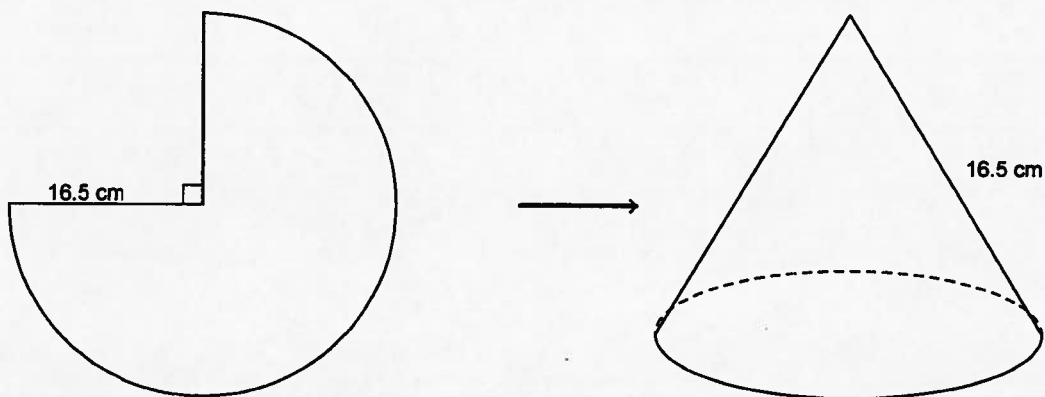
23. A square pyramid has a height of 18.7 cm. The side length of the base is 14.6 cm. Determine the measures of the angles in each triangular face. Give the measures to the nearest tenth of a degree.

18.7 cm

14.6 cm
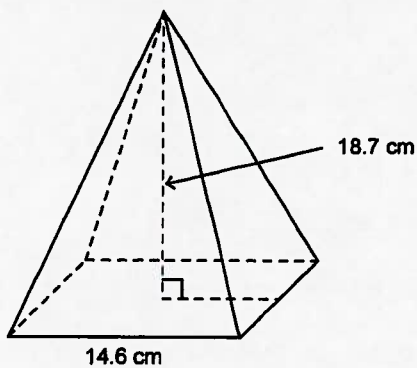
Trig test nov 2010   Practice ~~_____~~
Answer Section

MULTIPLE CHOICE

1. ANS: C   PTS: 1   DIF: D   OBJ: Section 3.3
   NAT: M4   TOP: Solving Right Triangles
   KEY: tangent ratio | determine an angle measure
2. ANS: C   PTS: 1   DIF: Easy
   REF: 2.6 Applying the Trigonometric Ratios   LOC: 10.M4
   TOP: Measurement   KEY: Procedural Knowledge

SHORT ANSWER

3. ANS:
   18.4°

   PTS: 1   DIF: Easy   REF: 2.1 The Tangent Ratio
   LOC: 10.M4   TOP: Measurement   KEY: Procedural Knowledge
4. ANS:
   $\dfrac{63}{16}$

   PTS: 1   DIF: Moderate   REF: 2.1 The Tangent Ratio
   LOC: 10.M4   TOP: Measurement   KEY: Procedural Knowledge
5. ANS:
   10.1 cm

   PTS: 1   DIF: Easy   REF: 2.2 Using the Tangent Ratio to Calculate Lengths
   LOC: 10.M4   TOP: Measurement   KEY: Procedural Knowledge
6. ANS:
   31.2°

   PTS: 1   DIF: Easy   REF: 2.4 The Sine and Cosine Ratios
   LOC: 10.M4   TOP: Measurement   KEY: Procedural Knowledge
7. ANS:
   59.4°

   PTS: 1   DIF: Easy   REF: 2.4 The Sine and Cosine Ratios
   LOC: 10.M4   TOP: Measurement   KEY: Procedural Knowledge
8. ANS:
   24°

   PTS: 1   DIF: Moderate   REF: 2.4 The Sine and Cosine Ratios
   LOC: 10.M4   TOP: Measurement   KEY: Procedural Knowledge

9. ANS:
3.3 km

    PTS: 1   DIF: Moderate
    REF: 2.5 Using the Sine and Cosine Ratios to Calculate Lengths
    LOC: 10.M4   TOP: Measurement   KEY: Procedural Knowledge

10. ANS:
$\angle F = 63°$; GH = 13.7 m; FH = 15.4 m

    PTS: 1   DIF: Easy   REF: 2.6 Applying the Trigonometric Ratios
    LOC: 10.M4   TOP: Measurement   KEY: Procedural Knowledge

11. ANS:
4.7 cm

    PTS: 1   DIF: Easy
    REF: 2.7 Solving Problems Involving More than One Right Triangle
    LOC: 10.M4   TOP: Measurement   KEY: Procedural Knowledge

12. ANS:
59.0°

    PTS: 1   DIF: Moderate
    REF: 2.7 Solving Problems Involving More than One Right Triangle
    LOC: 10.M4   TOP: Measurement   KEY: Procedural Knowledge

13. ANS:
$\angle B \doteq 56.3°$

    PTS: 1   DIF: Easy   REF: 2.1 The Tangent Ratio
    LOC: 10.M4   TOP: Measurement   KEY: Procedural Knowledge

14. ANS:
7.9 m

    PTS: 1   DIF: Moderate   REF: 2.2 Using the Tangent Ratio to Calculate Lengths
    LOC: 10.M4   TOP: Measurement   KEY: Procedural Knowledge

15. ANS:
2000 m

    PTS: 1   DIF: Moderate   REF: 2.2 Using the Tangent Ratio to Calculate Lengths
    LOC: 10.M4   TOP: Measurement   KEY: Procedural Knowledge

16. ANS:
6.4°

    PTS: 1   DIF: Moderate   REF: 2.4 The Sine and Cosine Ratios
    LOC: 10.M4   TOP: Measurement   KEY: Procedural Knowledge

17. ANS:
    25 m

    PTS: 1   DIF: Moderate
    REF: 2.7 Solving Problems Involving More than One Right Triangle
    LOC: 10.M4   TOP: Measurement   KEY: Procedural Knowledge

18. ANS:

$$\sin C = \frac{\text{side opposite } \angle C}{\text{hypotenuse}}$$

$$\sin C = \frac{AB}{AC}$$

$$\sin C = \frac{16}{18}$$

$$C = \sin^{-1}(0.8888)$$

$$C = 62.7340\ldots$$

$$C = 63°$$

$$\cos 63° = \frac{BC}{18}$$

$$18(\cos 63°) = BC$$

$$8.1718\ldots = BC$$

BC is approximately 8.2 cm.

PTS: 1   DIF: C   OBJ: Section 3.2   NAT: M4
TOP: The Sine and Cosine Ratios
KEY: sine ratio | cosine ratio | determine a distance using trigonometry

PROBLEM

19. ANS:
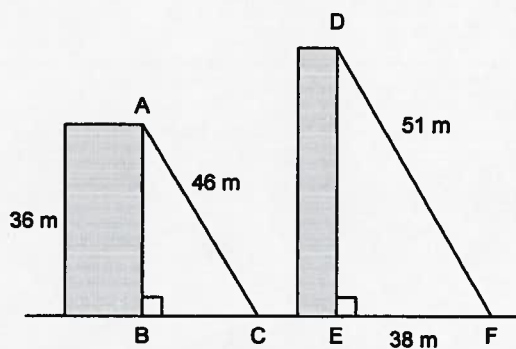∠C in right △ABC is the angle of inclination of the guy wire attached to the shorter building.

In right △ABC:
$$\sin C = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\sin C = \frac{AB}{AC}$$

$$\sin C = \frac{36}{46}$$

∠C = 51.5000...°

The angle of inclination of the guy wire attached to the shorter building is approximately 51.5°.

∠F in right △DEF is the angle of inclination of the guy wire attached to the taller building.

In right △DEF:
$$\cos F = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\cos F = \frac{EF}{DF}$$

$$\cos F = \frac{38}{51}$$

∠F = 41.8324...°

The angle of inclination of the guy wire attached to the taller building is approximately 41.8°.

The student is not correct. The angles of inclination are different.

PTS: 1   DIF: Difficult   REF: 2.4 The Sine and Cosine Ratios
LOC: 10.M4   TOP: Measurement
KEY: Communication | Problem-Solving Skills

20. ANS:
In right $\triangle$LMN, LN is the hypotenuse, LM is opposite $\angle$N, and MN is adjacent to $\angle$N. Use the sine ratio to determine the height of the triangle, LM.

$$\sin N = \frac{opposite}{hypotenuse}$$

$$\sin N = \frac{LM}{LN}$$

$$\sin 61° = \frac{LM}{650}$$

Solve this equation for LM.

$$650 \sin 61° = \frac{(650)(LM)}{650}$$

$$650 \sin 61° = LM$$

$$LM = 568.5028\ldots$$

Use the cosine ratio to determine the length of MN, the base of the triangle.

$$\cos N = \frac{adjacent}{hypotenuse}$$

$$\cos N = \frac{MN}{LN}$$

$$\cos 61° = \frac{MN}{650}$$

Solve this equation for MN.

$$650 \cos 61° = \frac{(650)(MN)}{650}$$

$$650 \cos 61° = MN$$

$$MN = 315.1262\ldots$$

Use the formula for the area, A, of a triangle.
$$A = \frac{1}{2} bh$$

$$A = \frac{1}{2} (568.5028\ldots)(315.1262\ldots)$$

$$A = 89\,575.0801\ldots$$

The area of the triangle is approximately $89\,575$ m^2.

PTS: 1   DIF: Difficult

REF: 2.5 Using the Sine and Cosine Ratios to Calculate Lengths
LOC: 10.M4   TOP: Measurement   KEY: Problem-Solving Skills

21. ANS:
Determine the length of LM first.
Use the Pythagorean Theorem in right $\triangle$LMN.

$$LN^2 = LM^2 + MN^2$$

$$8.1^2 = LM^2 + 4.2^2$$

$$LM^2 = 8.1^2 - 4.2^2$$

$$LM^2 = 47.97$$

$$LM = \sqrt{47.97}$$

$$LM = 6.9260\ldots$$

LM is approximately 6.9 cm.

Determine the measure of $\angle$N.
Since MN is adjacent to $\angle$N and LN is the hypotenuse, use the cosine ratio.

$$\cos N = \frac{adjacent}{hypotenuse}$$

$$\cos N = \frac{MN}{LN}$$

$$\cos N = \frac{4.2}{8.1}$$

$$\angle N = 58.7670\ldots$$

So, $\angle L = 90° - \angle N$

$$\angle L = 31.2329\ldots$$

$\angle$N is approximately 58.8° and $\angle$L is approximately 31.2°.

PTS: 1   DIF: Moderate   REF: 2.6 Applying the Trigonometric Ratios
LOC: 10.M4   TOP: Measurement
KEY: Communication | Problem-Solving Skills

22. ANS:

The circumference, C, of the base of the cone is $\frac{3}{4}$ the circumference of a circle with radius 16.5 cm. So, $\frac{3}{4}$ of the circumference is:

$C = \frac{3}{4}(2\pi r)$

$C = \frac{3}{4}(2)(\pi)(16.5)$

$C = 77.7544...$

To determine the angle of inclination of the side of the cone, we first need to find the radius, r, of the cone. Use the formula for the circumference of a circle.
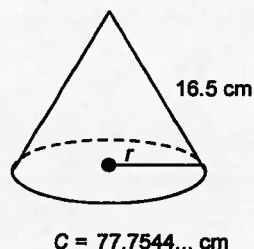
$C = 2\pi r$

$77.7544... = 2\pi r$

$\dfrac{77.7544...}{2\pi} = \dfrac{2\pi r}{2\pi}$

$\dfrac{77.7544...}{2\pi} = r$

$r = 12.375$

16.5 cm

$C = 77.7544...$ cm

In right $\triangle ABC$, $\angle C$ is the angle of inclination.
The radius, r, is equal to the length of BC.
Since BC is adjacent to $\angle C$ and AC is the hypotenuse, use the cosine ratio.
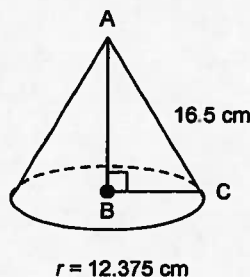
$\cos C = \dfrac{\text{adjacent}}{\text{hypotenuse}}$

$\cos C = \dfrac{BC}{AC}$

$\cos C = \dfrac{12.375}{16.5}$

$\cos C = 0.75$

$\angle C = 41.4096...°$

A

16.5 cm

C

B

$r = 12.375$ cm

The angle of inclination of the side of the cone is approximately 41.4°.

PTS: 1   DIF: Difficult   REF: 2.6 Applying the Trigonometric Ratios
LOC: 10.M4   TOP: Measurement   KEY: Problem-Solving Skills

23. ANS:
Label a diagram.
The square pyramid has 4 congruent triangular faces and each face is an isosceles triangle.
To calculate $\angle ADC$, first calculate the measure of AC.

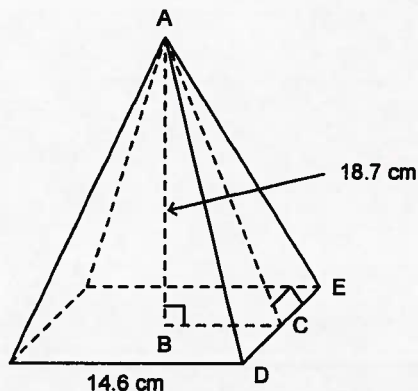Use the Pythagorean Theorem in right $\triangle ABC$.

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

$AC^2 = 18.7^2 + (\frac{14.6}{2})^2$

$AC^2 = 18.7^2 + 7.30^2$

$AC = \sqrt{18.7^2 + 7.30^2}$

$AC = 20.0743\ldots$

In right $\triangle ACD$, AC is opposite $\angle ADC$ and CD is adjacent to $\angle ADC$.
Use the tangent ratio in $\triangle ADC$.

$CD = \frac{1}{2}(14.6)$

$CD = 7.30$

$\tan D = \dfrac{\text{opposite}}{\text{adjacent}}$

$\tan D = \dfrac{AC}{CD}$

$\tan D = \dfrac{20.0743\ldots}{7.30}$

$\tan D = 2.7499\ldots$

$\angle D = 70.0163\ldots°$

In an isosceles triangle, the base angles are equal.
So, $\angle ADE = \angle AED = 70.0163\ldots°$
So, $\angle DAE = 180° - 70.0163\ldots° - 70.0163\ldots°$

$\angle DAE = 39.9673\ldots°$

The measures of the angles in each triangular face are approximately 70.0°, 70.0°, and 40.0°.

PTS: 1   DIF: Difficult
REF: 2.7 Solving Problems Involving More than One Right Triangle
LOC: 10.M4   TOP: Measurement   KEY: Problem-Solving Skills