Foundations of Math 11 - Chapter 3 and Chapter 4 Exam Review

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

D   1. Determine the length of *f* to the nearest tenth of a centimeter.
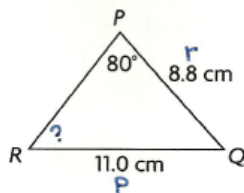

$$\frac{f}{\sin F} = \frac{e}{\sin E}$$

$$\frac{f}{\sin 53°} = \frac{92}{\sin 70°}$$

$$\frac{f \sin 70°}{\sin 70°} = \frac{92 \sin 53°}{\sin 70°}$$

$$f = 78.2 \text{ cm}$$

A) 78.6 cm
B) 79.0 cm
C) 79.4 cm
D) 78.2 cm

A   2. Determine the measure of ∠R to the nearest degree.

$$\frac{\sin R}{r} = \frac{\sin P}{p}$$

$$\frac{\sin R}{8.8} = \frac{\sin 80°}{11.0}$$

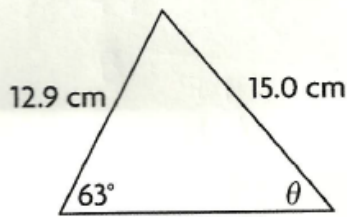$$\frac{11.0 \sin R}{11.0} = \frac{8.8 \sin 80°}{11.0}$$

$$\sin R = 0.7878$$

$$R = \sin^{-1}(0.7878)$$

$$R = 52°$$

A) 52°
B) 54°
C) 50°
D) 56°

_D_   3. Determine the measure of θ to the nearest degree.

$$\frac{\sin \theta}{12.9} = \frac{\sin 63°}{15.0}$$

$$\frac{15.0 \sin \theta}{15.0} = \frac{12.9 \sin 63°}{15.0}$$

$$\sin \theta = 0.7663$$

$$\theta = \sin^{-1}(0.7663)$$

$$\theta = 50°$$

12.9 cm   15.0 cm

63° θ

A) 30°
B) 60°
C) 40°
D) 50°

_A_   4. In $\triangle DEF$, $\angle D = 61°$, $d = 23.9$ cm, and $\angle E = 38°$.
Determine the length of side e to the nearest tenth of a centimeter.

A) 16.8 cm
B) 16.0 cm
C) 17.6 cm
D) 18.4 cm

$$\frac{e}{\sin E} = \frac{d}{\sin D}$$

$$\frac{e}{\sin 38} = \frac{23.9}{\sin 61}$$

$$\frac{e \sin 61°}{\sin 61°} = \frac{23.9 \sin 38°}{\sin 61°}$$

$$e = 16.8 \text{ cm}$$

_C_   5. In $\triangle XYZ$, $\angle X = 51°$, $x = 7.0$ cm, and $\angle Z = 41°$.
Determine the length of side y to the nearest tenth of a centimeter.

$$\angle Y = 180 - 51 - 41$$
$$\angle Y = 88°$$

A) 11.0 cm
B) 10.0 cm
C) 9.0 cm
D) 8.0 cm

$$\frac{y}{\sin Y} = \frac{x}{\sin X}$$

$$\frac{y}{\sin 88} = \frac{7.0}{\sin 51}$$

$$\frac{y \sin 51°}{\sin 51°} = \frac{7.0 \sin 88°}{\sin 51°}$$

$$y = 9.0 \text{ cm}$$

A 6. In $\triangle QRS$, $q = 10.0$ cm, $s = 9.0$ cm, and $\angle S = 61°$.
Determine the measure of $\angle Q$ to the nearest degree.

A) 76°
B) 75°
C) 78°
D) 77°

$$\frac{\sin Q}{q} = \frac{\sin S}{s}$$

$$\frac{\sin Q}{10.0} = \frac{\sin 61°}{9.0}$$

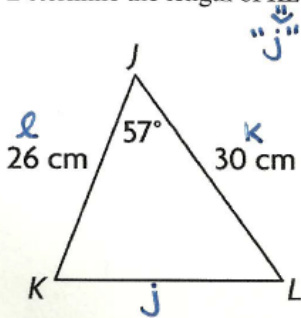$$\frac{9.0 \sin Q}{9.0} = \frac{10.0 \sin 61°}{9.0}$$

$$\sin Q = 0.9718$$
$$Q = \sin^{-1}(0.9718)$$
$$Q = 76°$$

A 7. Determine the length of KL to the nearest centimeter.

A) 27 cm
B) 26 cm
C) 34 cm
D) 33 cm

$$j^2 = k^2 + l^2 - 2kl \cos J$$
$$j^2 = (30)^2 + (26)^2 - 2(30)(26) \cos 57°$$
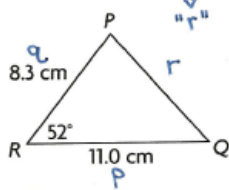$$j^2 = 900 + 676 - 1560(0.5446)$$
$$j^2 = 1576 - 849.5760$$
$$j^2 = 726.4240$$
$$j = \sqrt{726.4240}$$
$$j = 27.0 \text{ cm}$$

_D_ 8. Determine the length of PQ to the nearest tenth of a centimeter.

P

"r"

q
8.3 cm

r

52°
R   11.0 cm   Q
P

A) 9.4 cm
B) 9.1 cm
C) 8.5 cm
D) 8.8 cm

$r^2 = p^2 + q^2 - 2pq \cos R$
$r^2 = (11.0)^2 + (8.3)^2 - 2(11.0)(8.3) \cos 52°$
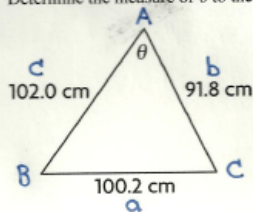$r^2 = 121 + 68.89 - 182.6 (0.6157)$
$r^2 = 189.89 - 112.4268$
$r^2 = 77.4632$
$r = \sqrt{77.4632}$
$r = 8.8 \text{ cm}$

_D_ 9. Determine the measure of θ to the nearest degree.

A

θ

c
102.0 cm

b
91.8 cm

B   100.2 cm   C
a

A) 60°
B) 59°
C) 61°
D) 62°

$\cos A = \dfrac{b^2 + c^2 - a^2}{2bc}$

$\cos A = \dfrac{(91.8)^2 + (102.0)^2 - (100.2)^2}{2(91.8)(102.0)}$

$\cos A = \dfrac{8427.24 + 10404 - 10040.04}{18727.2}$

$\cos A = \dfrac{8791.2}{18727.2}$

$\cos A = 0.4694$
$A = \cos^{-1}(0.4694)$
$A = 62°$

_B_ 10. In $\triangle DEF$, $d = 13.5$ cm, $e = 18.2$ cm, and $\angle F = 60°$.
Determine the measure of f to the nearest tenth of a centimeter.

A) 17.0 cm
B) 16.4 cm
C) 16.6 cm
D) 16.8 cm

$f^2 = d^2 + e^2 - 2de \cos F$
$f^2 = (13.5)^2 + (18.2)^2 - 2(13.5)(18.2) \cos 60°$
$f^2 = 182.25 + 331.24 - 491.4 (0.5000)$
$f^2 = 513.49 - 245.7$
$f^2 = 267.79$
$f = \sqrt{267.79}$
$f = 16.4 \text{ cm}$

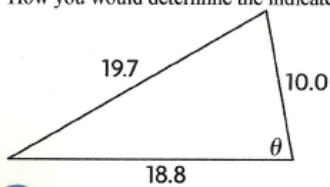$\cos D = \dfrac{e^2 + f^2 - d^2}{2ef}$

$\cos D = \dfrac{(16.8)^2 + (27.0)^2 - (23.9)^2}{2(16.8)(27.0)}$

_D_ 11. In $\triangle DEF$, $d = 23.9$ cm, $e = 16.8$ cm, and $f = 27.0$ cm. Determine the measure of $\angle D$ to the nearest degree.

$\cos D = \dfrac{282.24 + 729 - 571.21}{907.2}$

$\cos D = \dfrac{440.03}{907.2}$

A) 54°   B) 64°   C) 58°   D) 61°

$\cos D = 0.4850$

$D = 61°$

_A_ 12. How you would determine the indicated angle measure, if it is possible?

19.7   10.0   18.8 θ

All 3 sides ⇒ Law of Cosines

(A) the cosine law
B) not possible
C) primary trigonometric ratios
D) the sine law

_A_ 13. Which one of the following equations is valid?

$\ast \cos \theta = -\cos(180° - \theta)$

(A) $\cos 36° = -\cos 144°$
B) $\cos 36° = -\cos 36°$
C) $\cos 36° = \cos 144°$
D) none of the above

_B_ 14. Calculate sin 16° to four decimal places. Predict another term that equals sin 16°.

A) −0.2756; sin 164°
(B) 0.2756 ; sin 164°
C) 0.2756; −sin 16°
D) none of the above

$\sin 16° = 0.2756$
$\ast \sin \theta = \sin(180° - \theta)$
$\sin 16° = \sin 164°$

A 15. Calculate tan 25° to four decimal places. Predict another term that equals tan 20°.

   A) 0.4663; –tan 155°
   B) 0.4663; tan 155°
   C) –0.4663; tan 155°
   D) –0.4663; –tan 155°

$$\tan 25° = 0.4663$$
$$* \tan\theta = -\tan(180° - \theta)$$
$$\tan 25° = -\tan 155°$$

A 16. Which set of measurements can produce two possible triangles?

   A) $\angle A = 48°$, $a = 4.2$ m, $b = 5.0$ m
   B) $\angle A = 48°$, $a = 8.2$ m, $b = 13.0$ m
   C) $\angle A = 48°$, $a = 5.2$ m, $b = 7.0$ m
   D) $\angle A = 35°$, $a = 10.8$ m, $b = 8.0$ m

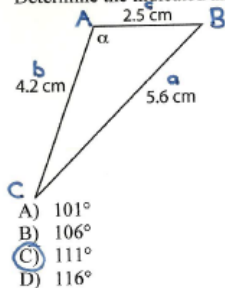$$h = b\sin A \quad h = 5.0\sin 48° \quad h = 3.7$$
$$* \text{since } h < a < b$$
$$\hookrightarrow 2 \text{ possible triangles.}$$

A 17. In $\triangle PQR$, $\angle P = 18°$, $q = 4.5$ m, and $r = 6.0$ m.
Which statement is true for this set of measurements?

$$* \text{No "matching pair"}$$

   A) This is not a SSA situation.
   B) This is a SSA situation; no triangle is possible.
   C) This is a SSA situation; only one triangle is possible.
   D) This is a SSA situation; two triangles are possible.

C 18. Determine the indicated angle measure to the nearest degree.

A — 2.5 cm — B, α, b = 4.2 cm, a = 5.6 cm, C

   A) 101°
   B) 106°
   C) 111°
   D) 116°

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$
$$\cos A = \frac{(4.2)^2 + (2.5)^2 - (5.6)^2}{2(4.2)(2.5)}$$
$$\cos A = \frac{17.64 + 6.25 - 31.36}{21}$$
$$\cos A = \frac{-7.47}{21}$$
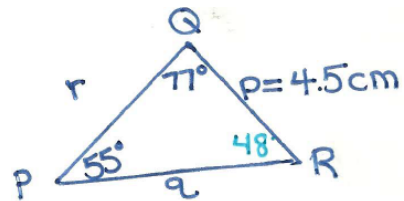$$\cos A = -0.3557$$
$$A = \cos^{-1}(-0.3557)$$
$$A = 111°$$

Problem

19. In $\triangle PQR$, $\angle P = 55°$, $\angle Q = 77°$, and $p = 4.5$ cm.
    Solve the triangle. Round angles to the nearest degree and sides to the nearest tenth of a centimeter.
    Show your work.

$<R = 180° - 55° - 77°$

$<R = 48°$

$$\frac{q}{\sin Q} = \frac{p}{\sin P}$$

$$\frac{q}{\sin 77°} = \frac{4.5}{\sin 55°}$$

$$\frac{q \sin 55°}{\sin 55°} = \frac{4.5 \sin 77°}{\sin 55°}$$

$$q = 5.4 \text{ cm}$$

$$\frac{r}{\sin R} = \frac{p}{\sin P}$$
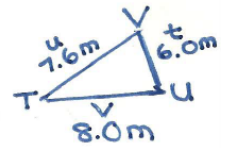
$$\frac{r}{\sin 48°} = \frac{4.5}{\sin 55°}$$

$$\frac{r \sin 55°}{\sin 55°} = \frac{4.5 \sin 48°}{\sin 55°}$$

$$r = 4.1 \text{ cm}$$

20. In ΔTUV, $t = 6.0$ m, $u = 7.6$ m, and $v = 8.0$ m.
    Solve the triangle. Round angles to the nearest degree and sides to the nearest tenth of a meter.
    Show your work.

$$\cos T = \frac{u^2 + v^2 - t^2}{2uv}$$

$$\cos T = \frac{(7.6)^2 + (8.0)^2 - (6.0)^2}{2(7.6)(8.0)}$$

$$\cos T = \frac{57.76 + 64.0 - 36.0}{121.6}$$

$$\cos T = \frac{85.76}{121.6}$$

$$\cos T = 0.7053$$

$$T = 45°$$

$$\cos V = \frac{t^2 + u^2 - v^2}{2tu}$$

$$\cos V = \frac{(6.0)^2 + (7.6)^2 - (8.0)^2}{2(6.0)(7.6)}$$

$$\cos V = \frac{36.0 + 57.76 - 64.0}{91.2}$$

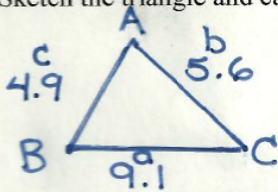$$\cos V = \frac{29.76}{91.2}$$

$$\cos V = 0.3263$$

$$V = 71°$$

$$U = 180° - 45° - 71°$$

$$U = 64°$$

21. A triangle has side lengths of 4.9 cm, 5.6 cm, and 9.1 cm.
    Sketch the triangle and calculate the measure of the largest angle to the nearest degree. Show your work.
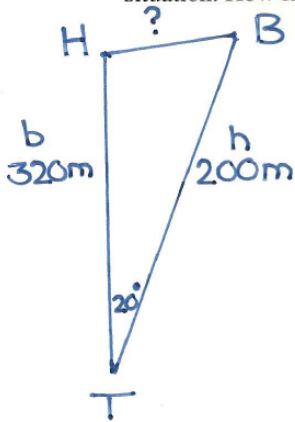
$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

$$\cos A = \frac{(5.6)^2 + (4.9)^2 - (9.1)^2}{2(5.6)(4.9)}$$

$$\cos A = \frac{31.36 + 24.01 - 82.81}{54.88}$$

$$\cos A = \frac{-27.44}{54.88}$$

$$\cos A = -0.5000 \qquad A = 120°$$

* Largest Angle
is opposite
largest Side.

22. While golfing, Valerie hits a tee shot from point *T* toward a hole at *H*. However, the ball veers 20° and lands at *B*. The scorecard says that *H* is 320 m from T. Valerie walks 200 m to her ball. Sketch a diagram of this situation. How far, to the nearest meter, is her ball from the hole? Show your work.

$$t^2 = b^2 + h^2 - 2bh \cos T$$
$$t^2 = (320)^2 + (200)^2 - 2(320)(200) \cos 20°$$
$$t^2 = 102400 + 40000 - 128000 (0.9397)$$
$$t^2 = 142\ 400 - 120\ 281.6$$
$$t^2 = 22\ 118.4$$
$$t = \sqrt{22\ 118.4}$$
$$t = 148.7m \Rightarrow 149m$$

Valerie's ball is 149 m from the hole.