

PJ.137 - 2, 3, 4a, 5a, 7

② $x^2 = y^2 + z^2 - 2yz \cos X$
 $x^2 = (15\text{cm})^2 + (18\text{cm})^2 - 2(15\text{cm})(18\text{cm}) \cos 46^\circ$
 $x^2 = 549\text{cm}^2 - 375.1155$
 $\sqrt{x^2} = \sqrt{173.88}$
 $x = 13.19\text{cm} = 13\text{cm}$

③ $p^2 = q^2 + r^2 - 2qr \cos P$
 $(5.9\text{m})^2 = (6.2\text{m})^2 + (2.3\text{m})^2 - 2(6.2\text{m})(2.3\text{m}) \cos P$
 $34.81\text{m}^2 = 43.73\text{m}^2 - 28.52\text{m}^2 \cos P$
 $-43.73\text{m}^2 = -43.73\text{m}^2$
 $\frac{-8.92\text{m}^2}{-28.52\text{m}^2} = \frac{-28.52\text{m}^2}{-28.52\text{m}^2} \cos P$
 $0.3128 = \cos P$

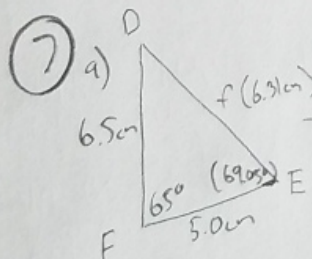
$72^\circ = 71.77^\circ = \cos^{-1}(0.3128)$

⑤ a) $(2.2\text{cm})^2 = (3.5\text{cm})^2 + (3.9\text{cm})^2 - 2(3.5)(3.9) \cos P$
 $4.84\text{cm}^2 = 27.46\text{cm}^2 - 27.3\text{cm}^2 \cos P$
 $-27.46 = -27.46$
 $\frac{-22.46}{-27.3} = \frac{-27.3\text{cm}^2 \cos P}{-27.3}$
 $0.8227 = \cos P$
 $34.6^\circ = \cos^{-1}(0.8227)$

$\angle P = 35^\circ$

④ a) Side AC (side b)
 $b^2 = a^2 + c^2 - 2ac \cos B$
 $b^2 = (9.5\text{cm})^2 + (10.5\text{cm})^2 - 2(9.5\text{cm})(10.5\text{cm}) \cos 40^\circ$
 $b^2 = 200.5\text{cm}^2 - 152.8259\text{cm}^2$
 $\sqrt{b^2} = \sqrt{47.67\text{cm}^2}$
 $b = 6.9\text{cm}$

$\angle D = 180^\circ - 65^\circ - 69.0^\circ = 45.9^\circ$

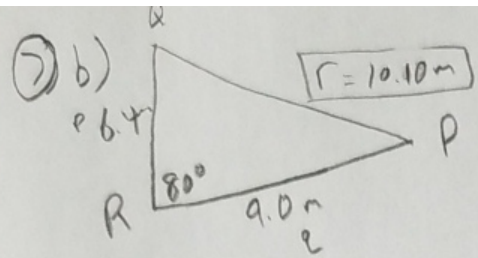


$f^2 = 6.5^2 + 5^2 - 2(6.5)(5) \cos 65^\circ$
 $\sqrt{f^2} = \sqrt{39.78\text{cm}^2}$
 $f = 6.31\text{cm}$

$\angle E$
 $e^2 = d^2 + f^2 - 2df \cos E$
 $6.5^2 + 5^2 + 6.31^2 - 2(5)(6.31) \cos E$
 $42.25 = 64.9161 - 63.1 \cos E$
 $-64.9161 = -63.1 \cos E$
 $\frac{-22.5661}{-63.1} = \frac{-63.1 \cos E}{-63.1 \cos E}$
 $0.3576 = \cos E$
 $69.0^\circ = \angle E$

OR

$\frac{\sin F}{f} = \frac{\sin E}{e}$
 $\frac{\sin 65^\circ}{6.31\text{cm}} = \frac{\sin E}{6.5\text{cm}}$
 $5.89\text{cm} = \frac{\sin E \times 6.31\text{cm}}{6.31\text{cm}}$
 $0.9336 = \sin E$
 $69.0^\circ = \angle E$



Side "r"

$$r^2 = (6.4)^2 + (9.0)^2 - 2(6.4)(9.0)\cos 80^\circ$$

$$\sqrt{r^2} = \sqrt{101.96}$$

$$r = 10.10 \text{ m}$$

$\angle P$

$$\frac{\sin P}{6.4 \text{ m}} = \frac{\sin 80^\circ}{10.10 \text{ m}}$$

$$\frac{\sin P \times 10.10 \text{ m}}{10.10 \text{ m}} = \frac{6.3028 \text{ m}}{10.10 \text{ m}}$$

$$\sin P = 0.6240$$

$$\angle P = 38.61^\circ$$

$$\angle Q = 180^\circ - 80^\circ - 38.61^\circ = 61.4^\circ$$

$\angle L$

$$l^2 = m^2 + n^2 - 2mn \cos L$$

$$5.5^2 = 4.6^2 + 3.3^2 - 2(4.6)(3.3) \cos L$$

$$30.25 = 32.45 - 30.36 \cos L$$

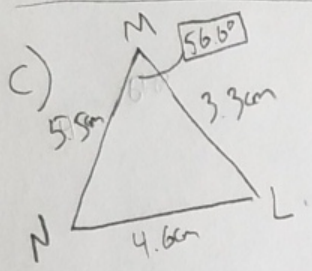
$$-32.05 = -32.05$$

$$-1.8 = -30.36 \cos L$$

$$\frac{-1.8}{-30.36} = \cos L$$

$$0.0593 = \cos L$$

$$86.6^\circ = \angle L$$



$\angle M$

$$m^2 = l^2 + n^2 - 2ln \cos M$$

$$4.6^2 = 5.5^2 + 3.3^2 - 2(5.5)(3.3) \cos M$$

$$21.16 = 41.14 - 36.3 \cos M$$

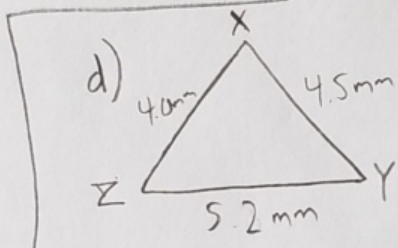
$$-41.14 + 41.14 = -36.3 \cos M$$

$$-19.98 = -36.3 \cos M$$

$$\frac{-19.98}{-36.3} = \cos M$$

$$0.5504 = \cos M$$

$$56.6^\circ = \angle M$$



$\angle X$

$$x^2 = y^2 + z^2 - 2yz \cos X$$

$$5.2^2 = 4^2 + 4.5^2 - 2(4)(4.5) \cos X$$

$$27.04 = 36.25 - 36 \cos X$$

$$-36.25 + 36.25 = -36 \cos X$$

$$-9.21 = -36 \cos X$$

$$\frac{-9.21}{-36} = \cos X$$

$$0.2558 = \cos X$$

$$75.2^\circ = X$$

$\angle Y$

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

$$\frac{\sin 75.2^\circ}{5.2 \text{ mm}} = \frac{\sin Y}{4.0 \text{ mm}}$$

$$3.87 \text{ mm} = \frac{\sin Y (5.2 \text{ mm})}{5.2 \text{ mm}}$$

$$0.7437 = \sin Y$$

$$48.0^\circ = Y$$

$\angle Z$

$$\frac{\sin Z}{z} = \frac{\sin Y}{y}$$

$$\frac{\sin Z}{4.5 \text{ mm}} = \frac{\sin 48^\circ}{4.0 \text{ mm}}$$

$$\sin Z = 0.8360$$

$$\angle Z = 56.7^\circ$$

$\angle N$

$$180^\circ - 56.6^\circ - 86.6^\circ$$

$$N = 36.8^\circ$$

$$75.2^\circ + 48.0^\circ + 56.7^\circ = 179.9^\circ$$

↳ not quite 180° due to rounding
 ↳ also Cos Law could be used in all situations