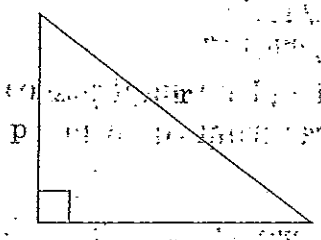
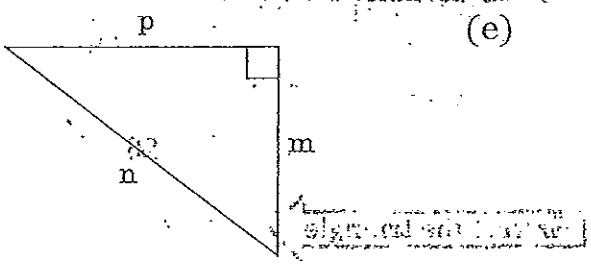
MISCELLANEOUS EXERCISES

1. Write down Pythagoras' Theorem for these diagrams.

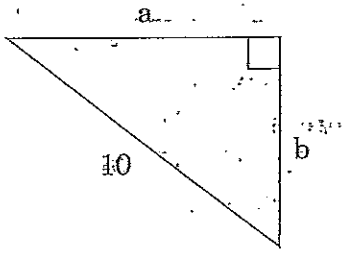
(a)



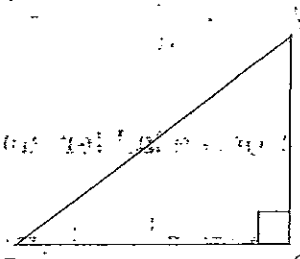
(b)



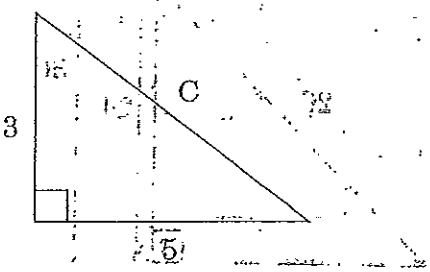
(c)



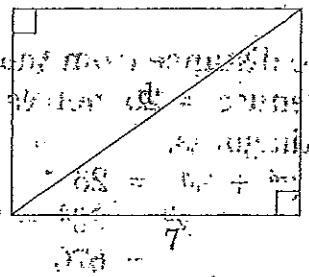
(d)



(e)

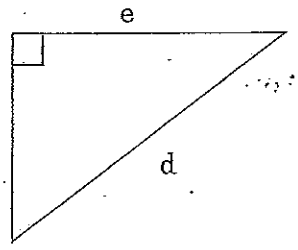


(f)

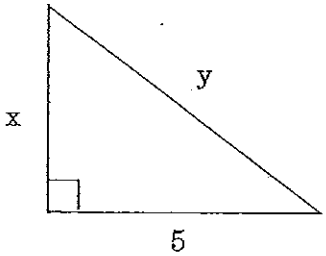


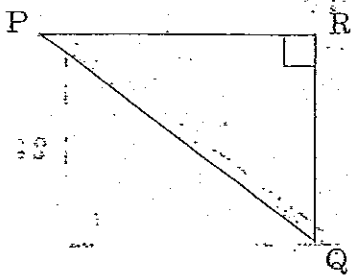
2. Complete the statements.

(a) $d^2 =$

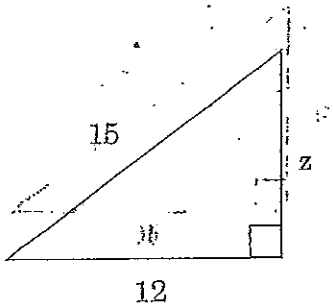


(b) $y^2 =$

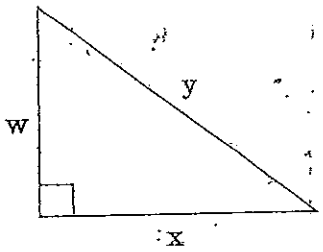


(c) 

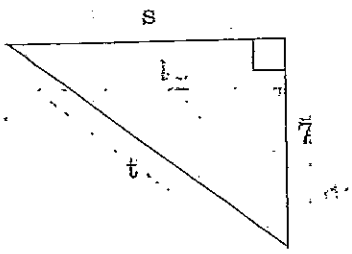
$PQ^2 =$

(d) 

$z^2 =$

(e) 

$w^2 + x^2 =$

(f) 

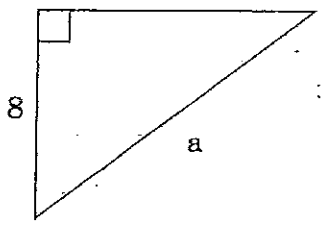
$s^2 + 7^2 =$

3. Evaluate:

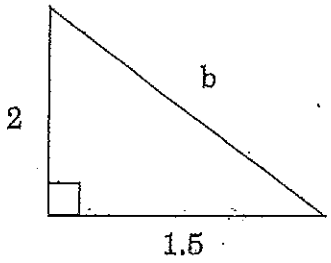
(a) $7^2 =$
(b) $11^2 =$
(c) $17^2 =$
(d) $29^2 =$
(e) $31^2 =$
(f) $\sqrt{144} =$
(g) $\sqrt{900} =$
(h) $\sqrt{256} =$
(i) $\sqrt{625} =$
(j) $\sqrt{16\,900} =$

4. Calculate the length of the hypotenuse in each diagram.

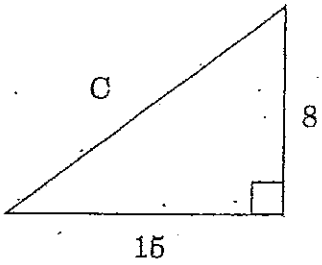
(a)



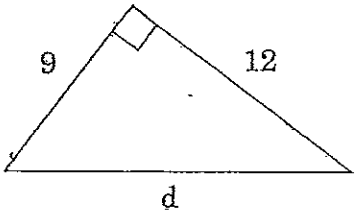
(b)



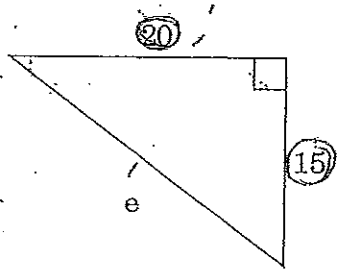
(c)



(d)



(e)



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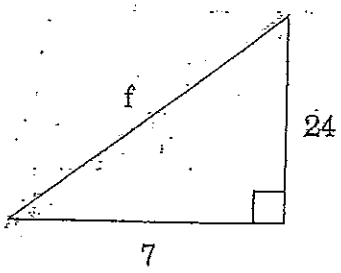
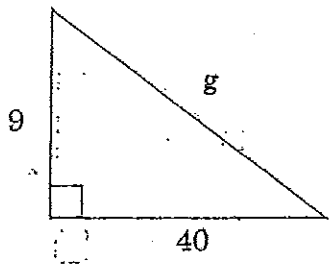
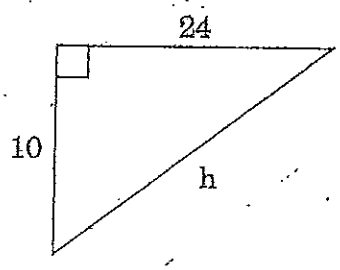


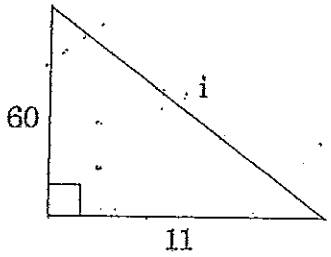
(g)



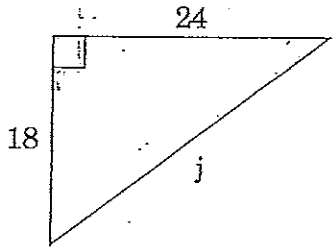
(h)



(i)

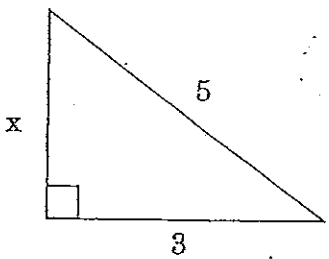


(j)

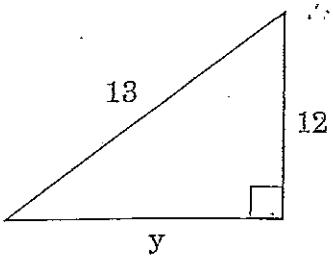


5. Calculate the length of the marked side in these diagrams.

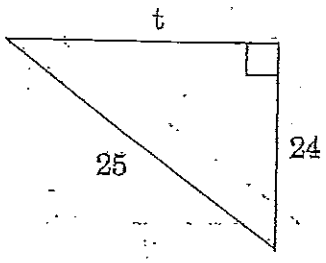
(a)



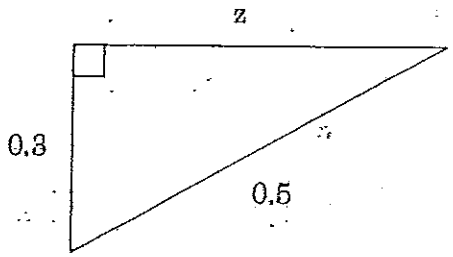
(b)



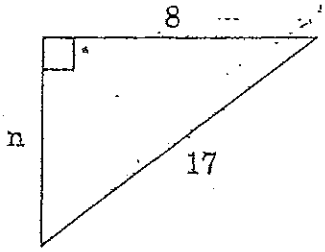
(c)



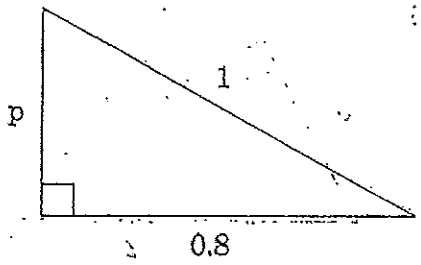
(f)



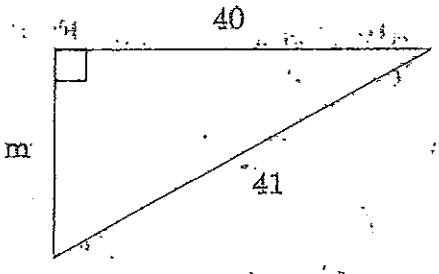
(d)



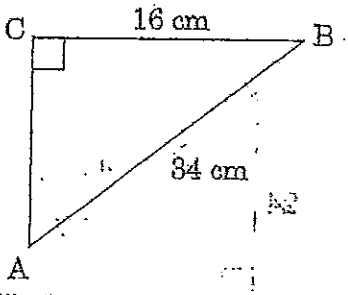
(g)



(e)



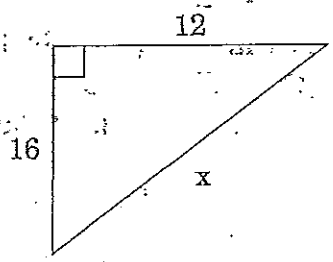
(h)



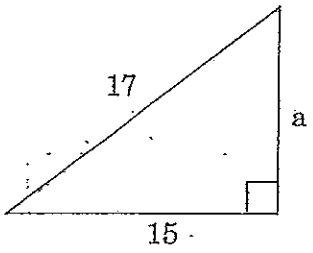
AC = _____

6. Calculate the size of the marked side.

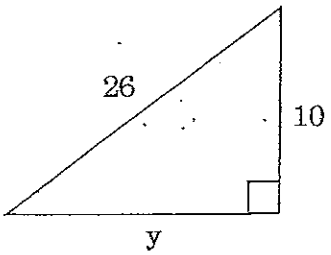
(a)



(c)



(b)



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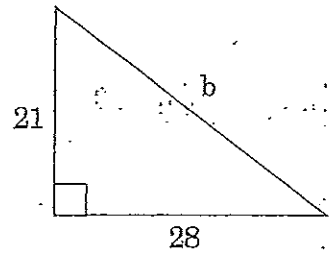

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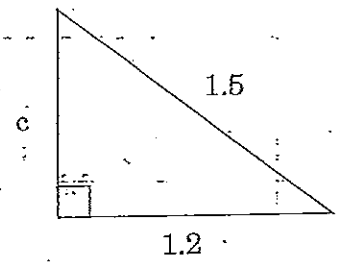

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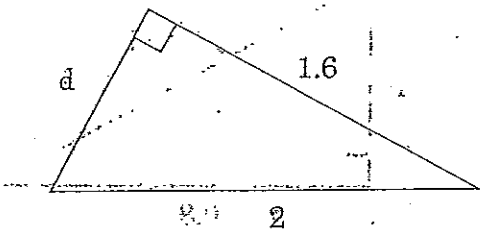

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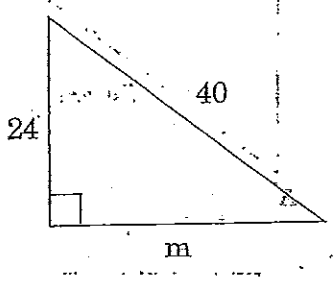
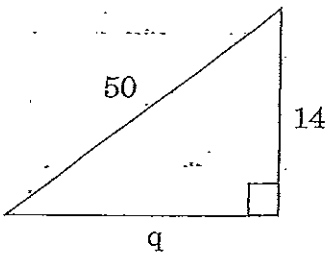
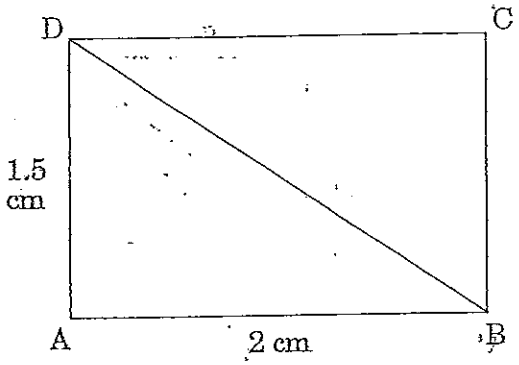


(h)

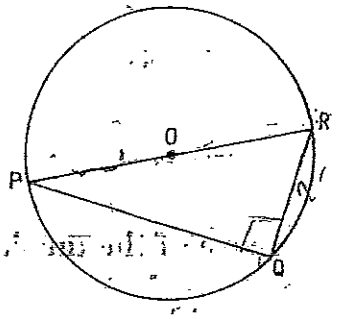


(i)



ABCD is a rectangle. Find length of BD.

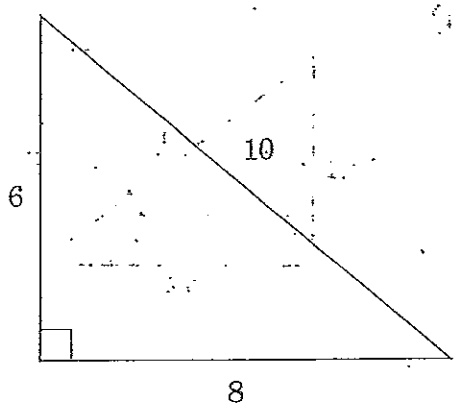
(j)



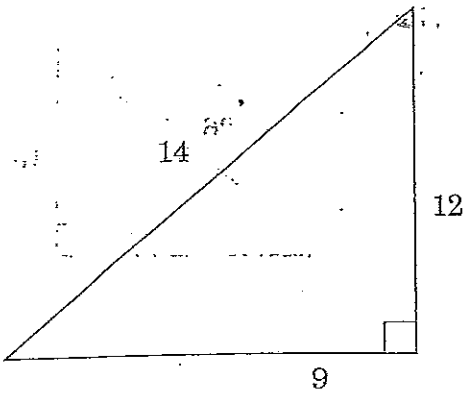
PR is diameter of circle centre O. $\angle PQR = 90°$. If OP is 25 cm and QR is 30 cm, calculate length of PQ.

7. Decide which of the following triangles are right angled. Give reasons.

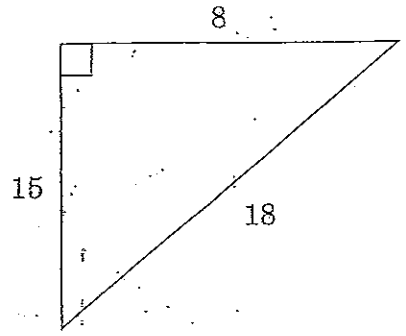
(a)



(b)



(c)



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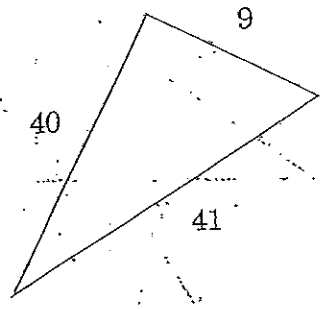
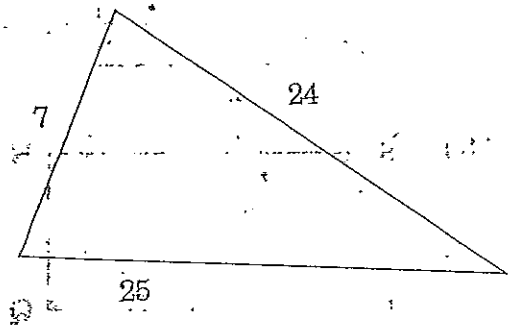


(d)



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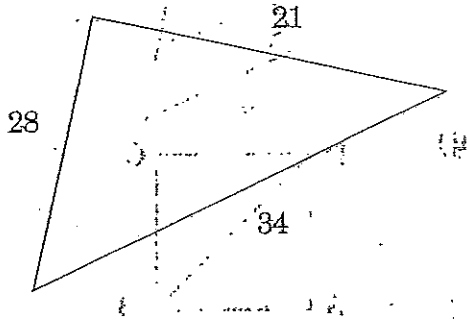
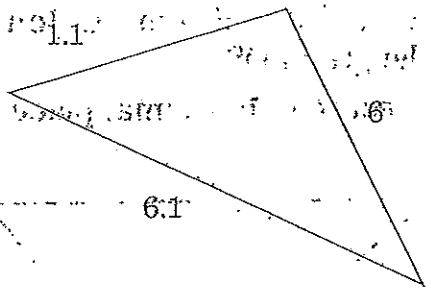
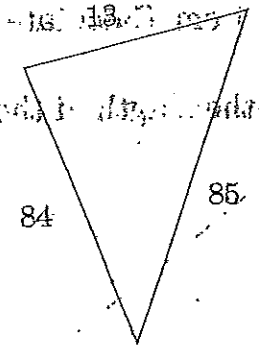


(e)



(h)

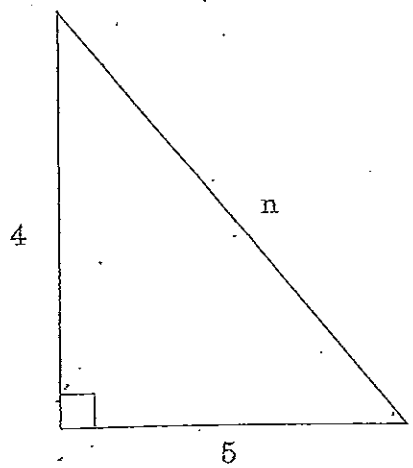


8. Complete the Pythagorean Triads

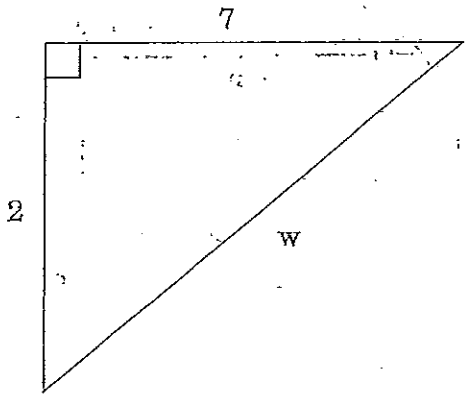
(a) {7, 24, a}
(b) {9, 12, y}
(c) {18, n, 30}
(d) {9, t, 41}
(e) {13, N, 85}
(f) {21, 72, p}
(g) {1.8, 2.4, z}
(h) $\{\frac{3}{4}, 1, t\}$

9. Calculate the length of the hypotenuse correct to one decimal place.

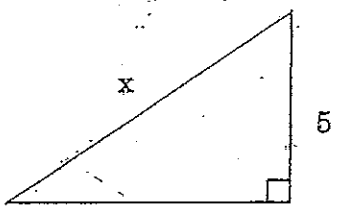
(a)



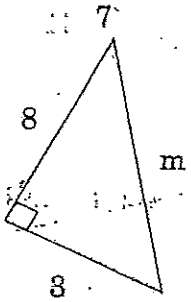
(b)



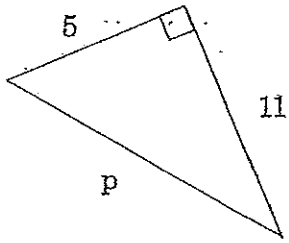
(c)



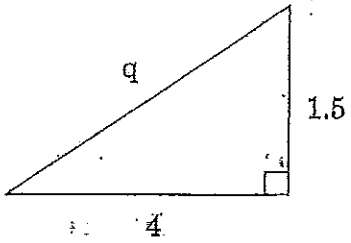
(d)



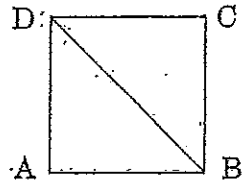
(e)



(f)

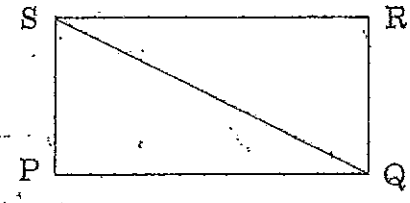


(g)



ABCD is a square with AD = 1 cm. Calculate length of AC.

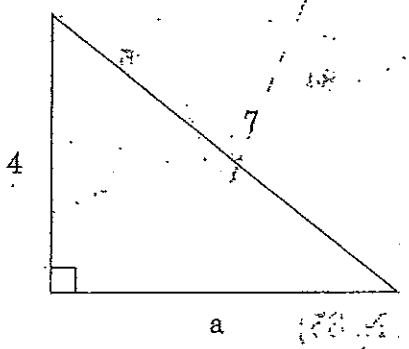
(h)



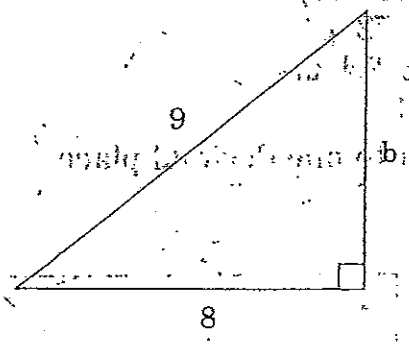
PQRS is a rectangle with PQ = 5 cm, RQ = 3 cm. Calculate the length of QS

10. Calculate the length of the marked side correct to one decimal place.

(a)



(b)



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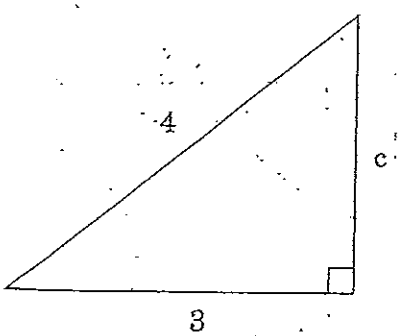
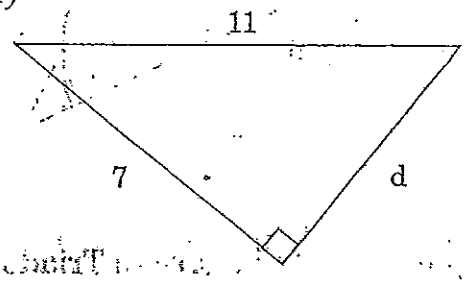
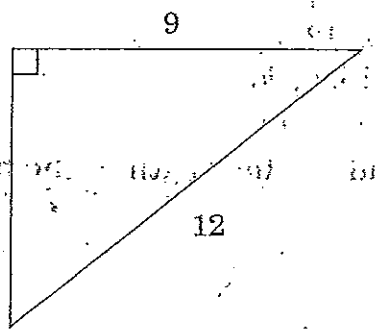


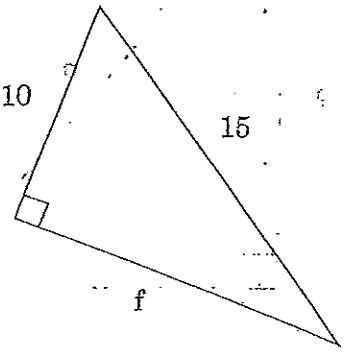
(d)



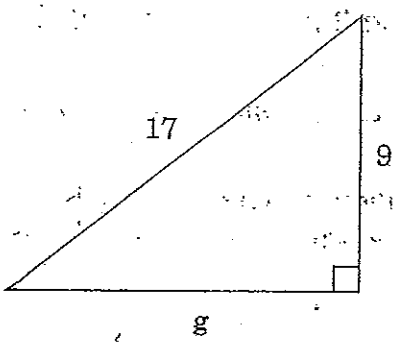
(e)



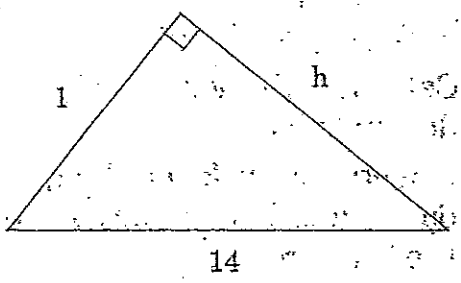
(f)



(g)

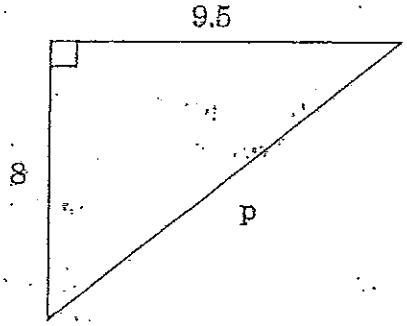


(h)

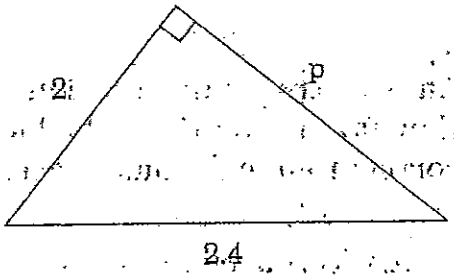


11. Calculate the length of the marked side correct to 3 significant figures.

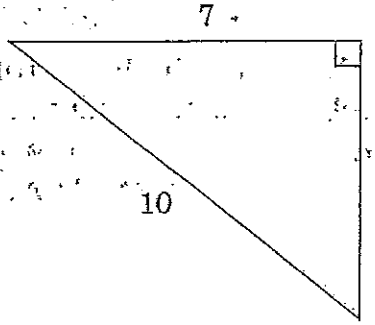
(a)



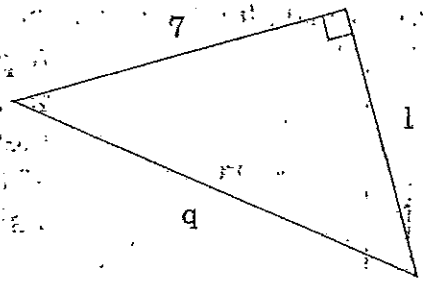
(e)



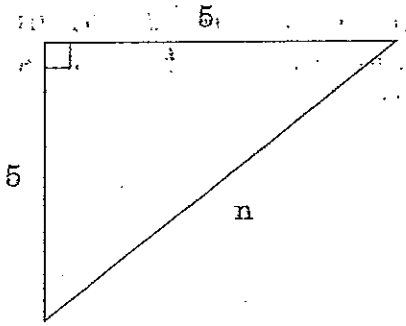
(b)



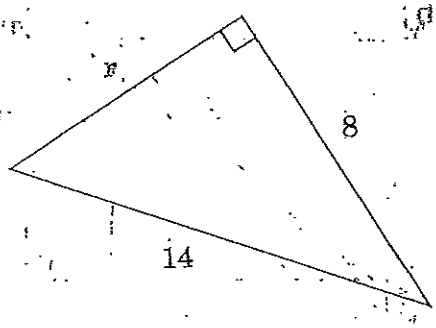
(f)



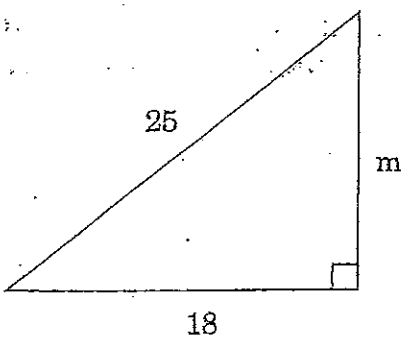
(c)



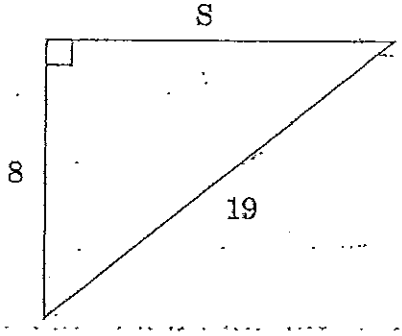
(g)



(d)

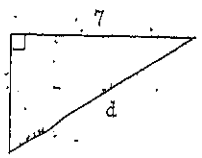


(h)



Chapter 7 — SOLUTIONS

1. (a) $r^2 = p^2 + q^2$
   (b) $n^2 = m^2 + p^2$
   (c) $10^2 = a^2 + b^2$
   (d) $PR^2 = PQ^2 + QR^2$
   (e) $c^2 = 3^2 + 5^2$
   (f) $d^2 = 4^2 + 7^2$



2. (a) $d^2 = c^2 + e^2$
   (b) $y^2 = x^2 + 5^2$
   (c) $PQ^2 = PR^2 + RQ^2$
   (d) $z^2 + 12^2 = 15^2$
   $\therefore z^2 = 15^2 - 12^2$
   (e) $w^2 + x^2 = y^2$
   (f) $s^2 + 7^2 = t^2$

3. (a) 49 (b) 121 (c) 289 (d) 841 (e) 961 (f) 12 (g) 30 (h) 16 (i) 25 (j) 130

4. (a) $a^2 = 6^2 + 8^2$
   $= 36 + 64$
   $= 100$
   $\therefore a = \sqrt{100}$
   $= 10$
   (b) $b^2 = 2^2 + 1.5^2$
   $= 4 + 2.25$
   $= 6.25$
   $\therefore b = \sqrt{6.25}$
   $= 2.5$
   (c) $c^2 = 8^2 + 15^2$
   $= 64 + 225$
   $= 289$
   $\therefore c = \sqrt{289}$
   $= 17$
   (d) $d^2 = 9^2 + 12^2$
   $= 81 + 144$
   $= 225$
   $\therefore d = \sqrt{225}$
   $= 15$
   (e) $e^2 = 15^2 + 20^2$
   $= 225 + 400$
   $= 625$
   $\therefore e = \sqrt{625}$
   $= 25$
   (f) $f^2 = 7^2 + 24^2$
   $= 49 + 576$
   $= 625$
   $\therefore f = \sqrt{625}$
   $= 25$
   (g) $g^2 = 9^2 + 40^2$
   $= 81 + 1600$
   $= 1681$
   $\therefore g = \sqrt{1681}$
   $= 41$
   (h) $h^2 = 10^2 + 24^2$
   $= 100 + 576$
   $= 676$
   $\therefore h = \sqrt{676}$
   $= 26$
   (i) $i^2 = 60^2 + 11^2$
   $= 3600 + 121$
   $= 3721$
   $\therefore i = \sqrt{3721}$
   $= 61$
   (j) $j^2 = 18^2 + 24^2$
   $= 324 + 576$
   $= 900$
   $\therefore j = \sqrt{900}$
   $= 30$

5. (a) $x^2 + 3^2 = 5^2$
   $\therefore x^2 = 5^2 - 3^2$
   $= 25 - 9$
   $= 16$
   $\therefore x = \sqrt{16}$
   $= 4$
   (b) $y^2 + 12^2 = 13^2$
   $\therefore y^2 = 13^2 - 12^2$
   $= 169 - 144$
   $= 25$
   $\therefore y = \sqrt{25}$
   $= 5$
   (c) $t^2 + 24^2 = 25^2$
   $\therefore t^2 = 25^2 - 24^2$
   $= 625 - 576$
   $= 49$
   $\therefore t = \sqrt{49}$
   $= 7$
   (d) $n^2 + 8^2 = 17^2$
   $\therefore n^2 = 17^2 - 8^2$
   $= 289 - 64$
   $= 225$
   $\therefore n = \sqrt{225}$
   $= 15$
   (e) $m^2 + 40^2 = 41^2$
   $\therefore m^2 = 41^2 - 40^2$
   $= 1681 - 1600$
   $= 81$
   $\therefore m = \sqrt{81}$
   $= 9$
   (f) $z^2 + 0.3^2 = 0.5^2$
   $\therefore z^2 = 0.5^2 - 0.3^2$
   $= 0.25 - 0.09$
   $= 0.16$
   $\therefore z = \sqrt{0.16}$
   $= 0.4$

(g) $p^2 + 0.8^2 = 1^2$
$\therefore p^2 = 1^2 - 0.8^2$
$= 1 - 0.64$
$= 0.36$
$\therefore p = \sqrt{0.36}$

6. (a) $x^2 = 16^2 + 12^2$
$= 256 + 144$
$= 400$
$\therefore x = \sqrt{400}$
$= 20$

(b) $y^2 + 10^2 = 26^2$
$\therefore y^2 = 26^2 - 10^2$
$= 676 - 100$
$= 576$
$\therefore y = \sqrt{576}$
$= 24$

(c) $a^2 + 15^2 = 17^2$
$\therefore a^2 = 17^2 - 15^2$
$= 289 - 225$
$= 64$
$\therefore a = \sqrt{64}$
$= 8$

(d) $b^2 = 21^2 + 28^2$
$= 441 + 784$
$= 1225$
$\therefore b = \sqrt{1225}$
$= 35$

(e) $c^2 + 1.2^2 = 1.5^2$
$\therefore c^2 = 1.5^2 - 1.2^2$
$= 2.25 - 1.44$
$= 0.81$
$\therefore c = \sqrt{0.81}$
$= 0.9$

(f) $d^2 + 1.6^2 = 2^2$
$\therefore d^2 = 2^2 - 1.6^2$
$= 4 - 2.56$
$= 1.44$
$\therefore d = \sqrt{1.44}$
$= 1.2$

(g) $n^2 + 24^2 = 40^2$
$\therefore n^2 = 40^2 - 24^2$
$= 1600 - 576$
$= 1024$
$\therefore n = \sqrt{1024}$
$= 32$

(h) Call AC = x cm.
$\therefore x^2 + 16^2 = 34^2$
$\therefore x^2 = 34^2 - 16^2$
$= 1156 - 256$
$= 900$
$\therefore x = \sqrt{900}$
$= 30$
Then AC = 30 cm.

(h) $q^2 + 14^2 = 50^2$
$\therefore q^2 = 50^2 - 14^2$
$= 2500 - 196$
$= 2304$
$\therefore q = \sqrt{2304}$
$= 48$

(i)

Let diagonal = x cm.
$\therefore x^2 = 1.5^2 + 2^2$
$= 2.25 + 4$
$= 6.25$
$\therefore x = \sqrt{6.25}$
$= 2.5$
Diagonal is 2.5 cm

(j)

As QP = 25
then PR = 50
(Diameter = 2 × radius)
Let PQ = x cm
$\therefore x^2 + 30^2 = 50^2$
$x^2 = 50^2 - 30^2$
$= 2500 - 900$
$= 1600$
$\therefore x = \sqrt{1600}$
$= 40$
PQ is 40 cm

7. (a) To prove that
$10^2 = 6^2 + 8^2$
LHS = 100
RHS = 36 + 64 = 100
$\therefore 10^2 = 6^2 + 8^2$
△ is right angled

(b) To prove that
$14^2 = 12^2 + 9^2$
LHS = 14^2 = 196
RHS = $12^2 + 9^2$
= 144 + 81
= 225
$\therefore 14^2 \neq 12^2 + 9^2$
△ is NOT right angled

(c) To prove that
$18^2 = 15^2 + 8^2$
LHS = 18^2
= 324
RHS = $15^2 + 8^2$
= 225 + 64
= 289
$\therefore 18^2 \neq 15^2 + 8^2$
△ is NOT right angled

(d) To prove that
$25^2 = 24^2 + 7^2$
LHS = 625
RHS = $24^2 + 7^2$
= 576 + 49
= 625
$\therefore 25^2 = 24^2 + 7^2$
△ is right angled

(e) To prove that
$6.1^2 = 6^2 + 1.1^2$
LHS = 6.1^2
= 37.21
RHS = $6^2 + 1.1^2$
= 36 + 1.21
= 37.21
$\therefore 6.1^2 = 6^2 + 1.1^2$
△ is right angled

(f) To prove that
$41^2 = 40^2 + 9^2$
LHS = 41^2
= 1681
RHS = $40^2 + 9^2$
= 1600 + 81
= 1681
$\therefore 41^2 = 40^2 + 9^2$
△ is right angled

(g) To prove that
$34^2 = 28^2 + 21^2$
LHS = 34^2
= 1156
RHS = $28^2 + 21^2$
= 784 + 441
= 1225
$\therefore 34^2 \neq 28^2 + 21^2$
△ is NOT right angled

(h) To prove that
$85^2 = 84^2 + 13^2$
LHS = 85^2
= 7225
RHS = $84^2 + 13^2$
= 7056 + 169
= 7225
$\therefore 85^2 = 84^2 + 13^2$
△ is right angled

8. (a) $a^2 = 7^2 + 24^2$
$= 49 + 576$
$= 625$
$a = \sqrt{625}$
$= 25$
Triad is {7, 24, 25}

(b) $y^2 = 9^2 + 12^2$
$= 81 + 144$
$= 225$
$\therefore y = \sqrt{225}$
$= 15$
Triad is {9, 12, 15}

(c) $18^2 + n^2 = 30^2$
$\therefore n^2 = 30^2 - 18^2$
$= 900 - 324$
$= 576$
$n = \sqrt{576}$
$= 24$
Triad is {18, 24, 30}

(d) $9^2 + t^2 = 41^2$
$\therefore t^2 = 41^2 - 9^2$
$= 1681 - 81$
$= 1600$
$\therefore t = \sqrt{1600}$
$= 40$
Triad is {9, 40, 41}

9. (a) $n^2 = 4^2 + 5^2$
$= 16 + 25$
$= 41$
$\therefore n = \sqrt{41}$
$= 6.4$ (to 1 decimal place)

(b) $w^2 = 2^2 + 7^2$
$= 4 + 49$
$= 53$
$\therefore w = \sqrt{53}$
$= 7.3$ (to 1 decimal place)

(c) $x^2 = 5^2 + 7^2$
$= 25 + 49$
$= 74$
$\therefore x = \sqrt{74}$
$= 8.6$ (to 1 decimal place)

(d) $m^2 = 8^2 + 3^2$
$= 64 + 9$
$= 73$
$\therefore m = \sqrt{73}$
$= 8.5$ (to 1 decimal place)

(e) $13^2 + N^2 = 85^2$
$N^2 = 85^2 - 13^2$
$= 7225 - 169$
$= 7056$
$\therefore N = \sqrt{7056}$
$= 84$
Triad is {13, 84, 85}

(f) $21^2 + 72^2 = p^2$
$\therefore p^2 = 441 + 5184$
$= 5625$
$\therefore p = \sqrt{5625}$
$= 75$
Triad is {21, 72, 75}

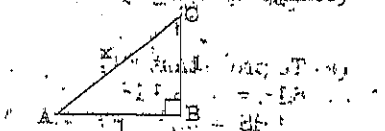
(g) $1.8^2 + 2.4^2 = z^2$
$\therefore z^2 = 3.24 + 5.76$
$= 9$
$\therefore z = \sqrt{9}$
$= 3$
Triad is {1.8, 2.4, 3}

(h) $(\frac{3}{4})^2 + 1^2 = t^2$
$\therefore t^2 = \frac{9}{16} + 1$
$= \frac{25}{16}$
$\therefore t = \sqrt{\frac{25}{16}}$
$= \frac{5}{4}$
Triad is $\{\frac{3}{4}, 1, 1\frac{1}{4}\}$

(i) $p^2 = 5^2 + 11^2$
$= 25 + 121$
$= 146$
$\therefore P = \sqrt{146}$
$= 12.1$ (to 1 decimal place)

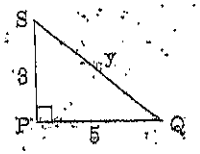
(j) $q^2 = 1.5^2 + 4^2$
$= 2.25 + 16$
$= 18.25$
$\therefore q = \sqrt{18.25}$
$= 4.3$ (to 1 decimal place)

(g)



Let AC = x cm
$\therefore x^2 = 1^2 + 1^2$
$= 2$
$\therefore x = \sqrt{2}$
$= 1.4$ (to 1 decimal place)
AC = 1.4 cm

(h)



Let QS = y cm
$y^2 = 8^2 + 5^2$
$= 9 + 25$
$= 34$
$\therefore y = \sqrt{34}$
$= 5.8$ (to 1 decimal place)
$\therefore$ QS = 5.8 cm

10. (a) $a^2 + 4^2 = 7^2$
$\therefore a^2 = 7^2 - 4^2$
$= 49 - 16$
$= 33$
$\therefore a = \sqrt{33}$
$= 5.7$
(to 1 decimal place)

(b) $b^2 + 8^2 = 9^2$
$b^2 = 9^2 - 8^2$
$= 81 - 64$
$= 17$
$\therefore b = \sqrt{17}$
$= 4.1$
(to 1 decimal place)

(c) $c^2 + 3^2 = 4^2$
$\therefore c^2 = 4^2 - 3^2$
$= 16 - 9$
$= 7$
$\therefore c = \sqrt{7}$
$= 2.6$
(to 1 decimal place)

(d) $d^2 + 7^2 = 11^2$
$\therefore d^2 = 11^2 - 7^2$
$= 121 - 49$
$= 72$
$\therefore d = \sqrt{72}$
$= 8.5$
(to 1 decimal place)

(e) $e^2 + 9^2 = 12^2$
$\therefore e^2 = 12^2 - 9^2$
$= 144 - 81$
$= 63$
$\therefore e = \sqrt{63}$
$= 7.9$
(to 1 decimal place)

(f) $f^2 + 10^2 = 15^2$
$\therefore f^2 = 15^2 - 10^2$
$= 225 - 100$
$= 125$
$\therefore f = \sqrt{125}$
$= 11.2$
(to 1 decimal place)

(g) $g^2 + 9^2 = 17^2$
$\therefore g^2 = 17^2 - 9^2$
$= 289 - 81$
$= 208$
$\therefore g = \sqrt{208}$
$= 14.4$
(to 1 decimal place)

(h) $h^2 + 1^2 = 14^2$
$\therefore h^2 = 14^2 - 1^2$
$= 196 - 1$
$= 195$
$\therefore h = \sqrt{195}$
$= 14.0$
(to 1 decimal place)

11. (a) $p^2 = 8^2 + 9.5^2$
$= 64 + 90.25$
$= 154.25$
$\therefore p = \sqrt{154.25}$
$= 12.4$
(to 3 significant figures)

(b) $q^2 + 7^2 = 10^2$
$\therefore q^2 = 10^2 - 7^2$
$= 100 - 49$
$= 51$
$\therefore q = \sqrt{51}$
$= 7.14$
(to 3 significant figures)

(c) $n^2 = 5^2 + 5^2$
$= 25 + 25$
$= 50$
$\therefore n = \sqrt{50}$
$= 7.07$
(3 significant figures)

(d) $m^2 + 18^2 = 25^2$
$m^2 = 25^2 - 18^2$
$= 625 - 324$
$= 301$
$\therefore m = \sqrt{301}$
$= 17.3$
(to 3 significant figures)

(e) $p^2 + 2^2 = 2.4^2$
$\therefore p^2 = 2.4^2 - 2^2$
$= 5.76 - 4$
$= 1.76$
$\therefore p = \sqrt{1.76}$
$= 1.33$
(to 3 significant figures)

(f) $q^2 = 7^2 + 1^2$
$= 49 + 1$
$= 50$
$\therefore q = \sqrt{50}$
$= 7.07$
(to 3 significant figures)

(g) $r^2 + 8^2 = 14^2$
$\therefore r^2 = 14^2 - 8^2$
$= 196 - 64$
$= 132$
$\therefore r = \sqrt{132}$
$= 11.5$
(to 3 significant figures)

(h) $s^2 + 8^2 = 19^2$
$\therefore s^2 = 19^2 - 8^2$
$= 361 - 64$
$= 297$
$\therefore s = \sqrt{297}$
$= 17.2$
(to 3 significant figures)