Applying the Pythagorean Theorem

Textbooks (yeah, remember those?)
Page 66 #s 6, 7, 8, 10, 12, 13, 17, 18 & 19

6. Find the length of the hypotenuse of each triangle. Round your answers to the nearest tenth.

(a) \( c^2 = a^2 + b^2 \)
   \( c^2 = 5^2 + 4^2 \)
   \( c^2 = 25 + 16 \)
   \( c^2 = 41 \)
   \( c = \sqrt{41} = 6.4 \text{ cm} \)

(b) \( c^2 = a^2 + b^2 \)
   \( c^2 = 7^2 + 7^2 \)
   \( c^2 = 49 + 49 \)
   \( c^2 = 98 \)
   \( c = \sqrt{98} \approx 9.9 \text{ m} \)
7. Find the length of the hypotenuse of each triangle. Round your answers to the nearest tenth.

(a) \( c^2 = a^2 + b^2 \)
   \( c^2 = 4.5^2 + 2.6^2 \)
   \( c^2 = 20.25 + 6.76 \)
   \( c^2 = 27.01 \)
   \( c = \sqrt{27.01} \)
   \( c = 5.2 \text{ m} \)

(b) \( c^2 = a^2 + b^2 \)
   \( c^2 = 7.5^2 + 9.8^2 \)
   \( c^2 = 56.25 + 96.04 \)
   \( c^2 = 152.29 \)
   \( c = \sqrt{152.29} \)
   \( c = 12.3 \text{ m} \)

8. Which of the following could be the side lengths of a right triangle? Explain how you came to your conclusions.

   (a) 2 cm, 4 cm, 5 cm
   \( 2^2 + 4^2 = 5^2 \)
   \( 4 + 16 = 25 \)
   \( 20 \neq 25 \)
   \( \Rightarrow \) Not a right \( \Delta \)

   (b) 6 cm, 8 cm, 10 cm
   \( 6^2 + 8^2 = 10^2 \)
   \( 36 + 64 = 100 \)
   \( 100 = 100 \)
   \( \Rightarrow \) 15 a right \( \Delta \)

   (c) 9 cm, 12 cm, 15 cm
   \( 9^2 + 12^2 = 15^2 \)
   \( 81 + 144 = 225 \)
   \( 225 = 225 \)
   \( \Rightarrow \) 15 a right \( \Delta \)

   (d) 7 cm, 8 cm, 9 cm
   \( 7^2 + 8^2 = 12^2 \)
   \( 49 + 64 = 144 \)
   \( 113 \neq 144 \)
   \( \Rightarrow \) Not a right \( \Delta \)
10. Ahmed delivers newspapers. He starts from home and goes down his street a distance of 120 m. Then, he turns left at the corner and goes another 100 m to the last house on his route. Ahmed has a walkie-talkie with a range of 150 m. Can he call his brother, who is at home, from the farthest point on his route?

\[ x^2 = 100^2 + 120^2 \]
\[ x^2 = 10000 + 14400 \]
\[ x^2 = 24400 \]
\[ x = \sqrt{24400} \]
\[ x = 156.2 \text{ m} \]

Can’t talk on the walkie-talkie. It is out of range by 6 meters.

12. Tia is making a handrail for a staircase. The staircase rises 3.6 m over a horizontal distance of 3.2 m. How long should the handrail be, to the nearest tenth of a metre?

\[ c^2 = a^2 + b^2 \]
\[ x^2 = 3.2^2 + 3.6^2 \]
\[ x^2 = 10.24 + 12.96 \]
\[ x^2 = 23.2 \]
\[ x = \sqrt{23.2} \]
\[ x = 4.8 \text{ m} \]
13. On his way to the cinema, Tony needs to cross a rectangular parking lot. The lot measures 80 m by 85 m. How many metres fewer will Tony walk if he goes diagonally across the lot rather than walking the length and width? Round your answer to the nearest metre.

\[
x^2 = 80^2 + 85^2
\]
\[
85m \quad x^2 = 6400 + 7225
\]
\[
\quad x^2 = 13625
\]
\[
\quad x = \sqrt{13625}
\]
\[
\quad x = 116.7\ m
\]

Walking around the edge = 80 + 85

Distance Saved = 165 - 116.7

= 48.3m

17. Jessie is preparing a gymnastics routine for an upcoming competition. Each of her cartwheels uses a distance of 2.5 m to complete. How many cartwheels can she perform along the diagonal of an 8 m by 8 m gymnasium mat?

\[
x^2 = 8^2 + 8^2
\]
\[
8m \quad x^2 = 64 + 64
\]
\[
\quad x^2 = 128
\]
\[
\quad x = \sqrt{128}
\]
\[
\quad x = 11.3\ m
\]

Total of 4 cartwheels

\# of cartwheels = 11.3 \div 2.5

= 4.5
18. A doorway is 0.78 m wide and 2.00 m high. Will a round tabletop with a diameter of 2.50 m fit through the doorway?

a) Draw and label a diagram to model the problem.

b) Use numbers and words and justifications to support your answer.

\[ x^2 = 0.78^2 + 2.00^2 \]
\[ 2.00^2 = 4.00 \]
\[ x^2 = 0.6084 + 4 \]
\[ x^2 = 4.6084 \]
\[ x = \sqrt{4.6084} \]
\[ x \approx 2.15 \text{ m} \]

\( \Rightarrow \) Diameter is too big. It needs to be less than 2.15 m to fit.

19. A square peg fits snugly inside a round hole, as shown. What is the perimeter of the square, to the nearest millimetre?

\[ x^2 = 1.2^2 + 1.2^2 \]
\[ x^2 = 1.44 + 1.44 \]
\[ x^2 = 2.88 \]
\[ x = \sqrt{2.88} \]
\[ x \approx 1.697 \text{ cm} \]

\[ P = 4 \times x \]
\[ P = 4 	imes 1.697 \]
\[ P \approx 6.788 \text{ cm} \]