

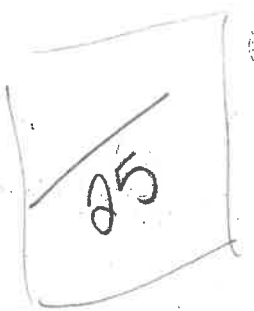
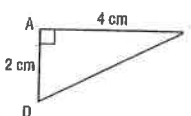
Name _____ Key

6.3 Right Triangles and the Tangent Ratio

MATHPOWER™ Nine, pp. 236-238

One example of a trigonometric ratio is the tangent ratio.
 In a right triangle, the tangent ratio of an acute angle is defined as $\frac{\text{side opposite the angle}}{\text{side adjacent to the angle}}$.

In $\triangle FGH$, the tangent ratio of $\angle H$ is $\frac{FG}{GH}$.
 In $\triangle FGH$, the tangent ratio of $\angle F$ is $\frac{GH}{FG}$.

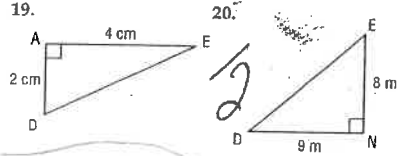


- Use a calculator to find the tangent of each angle, to three decimal places.
- | | |
|----------------------------|----------------------------|
| 1. 37° <u>0.754</u> | 2. 84° <u>9.514</u> |
| 3. 15° <u>0.268</u> | 4. 45° <u>1</u> |
| 5. 60° <u>1.732</u> | 6. 72° <u>3.078</u> |

- Find $\angle K$, to the nearest degree.
- | | |
|---|--|
| 7. $\tan K = 0.575$ <u>30°</u> | 8. $\tan K = 0.243$ <u>14°</u> |
| 9. $\tan K = 1.925$ <u>63°</u> | 10. $\tan K = 2.750$ <u>70°</u> |
| 11. $\tan K = 3.198$ <u>73°</u> | 12. $\tan K = 50.375$ <u>89°</u> |

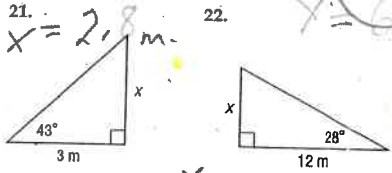
- Find $\angle Q$, to the nearest degree.
- | | |
|--|--|
| 13. $\tan Q = \frac{1}{3}$ <u>18°</u> | 14. $\tan Q = \frac{5}{8}$ <u>32°</u> |
| 15. $\tan Q = \frac{5}{4}$ <u>51°</u> | 16. $\tan Q = \frac{12}{5}$ <u>67°</u> |
| 17. $\tan Q = \frac{49}{9}$ <u>80°</u> | 18. $\tan Q = \frac{89}{2}$ <u>89°</u> |

Calculate $\tan D$ and $\angle D$ and $\tan E$ and $\angle E$. Round each angle measure, to the nearest degree.

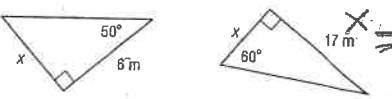


$\tan D = \frac{4}{2} = 2$
 $\angle D = \tan^{-1}(2) = 63^\circ$
 $\tan E = \frac{8}{9}$
 $\angle E = \tan^{-1}(\frac{8}{9}) = 27^\circ$

Calculate x, to the nearest tenth of a metre.

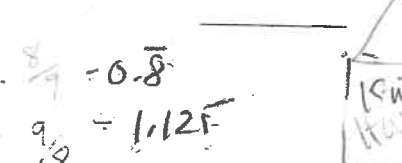


21. $x = 2.8$ m
 22. $x = 6.4$ m



23. $x = 7.2$ m
 24. $x = 9.8$ m

25. The backyard of a home is in the shape of a right triangle in which one leg is twice as long as the other leg. If one of the legs is the side of the house, and it is 15 m long, find the length of the other leg. Draw a diagram to show the backyard.



$\tan D = \frac{15}{30} = 0.5$
 $\angle D = \tan^{-1}(0.5) = 27^\circ$
 $\angle E = 48^\circ$

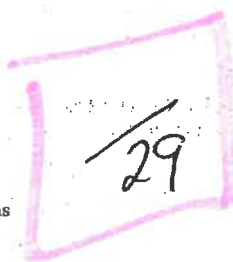
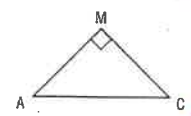
Name _____ 115

6.4 Right Triangles and the Sine Ratio

MATHPOWER™ Nine, pp. 239-241

A second example of a trigonometric ratio is the sine ratio.
 In a right triangle, the sine ratio of an acute angle is defined as $\frac{\text{side opposite the angle}}{\text{hypotenuse}}$.

In $\triangle MAC$, the sine ratio of $\angle A$ is $\frac{MC}{AC}$.
 In $\triangle MAC$, the sine ratio of $\angle C$ is $\frac{AM}{AC}$.



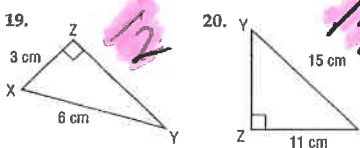
Use a calculator to find the sine of each angle, to three decimal places.

- | | |
|----------------------------|----------------------------|
| 1. 62° <u>0.883</u> | 2. 21° <u>0.358</u> |
| 3. 85° <u>0.996</u> | 4. 45° <u>0.707</u> |
| 5. 5° <u>0.087</u> | 6. 70° <u>0.940</u> |

- Find $\angle B$, to the nearest degree.
- | | |
|---|---|
| 7. $\sin B = 0.990$ <u>82°</u> | 8. $\sin B = 0.208$ <u>12°</u> |
| 9. $\sin B = 0.500$ <u>30°</u> | 10. $\sin B = 1.000$ <u>90°</u> |
| 11. $\sin B = 0.345$ <u>20°</u> | 12. $\sin B = 0.755$ <u>49°</u> |

- Find $\angle G$, to the nearest degree.
- | | |
|---|---|
| 13. $\sin G = \frac{1}{2}$ <u>30°</u> | 14. $\sin G = \frac{2}{5}$ <u>24°</u> |
| 15. $\sin G = \frac{4}{5}$ <u>53°</u> | 16. $\sin G = \frac{5}{8}$ <u>39°</u> |
| 17. $\sin G = \frac{1}{11}$ <u>5°</u> | 18. $\sin G = \frac{8}{9}$ <u>63°</u> |

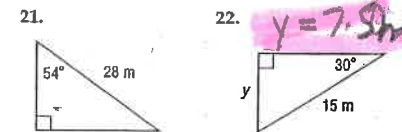
Calculate $\sin Y$. Then, find $\angle Y$, to the nearest degree.



19. $\sin Y = \frac{3}{6} = 0.5$
 $\angle Y = \sin^{-1}(\frac{3}{6}) = 30^\circ$

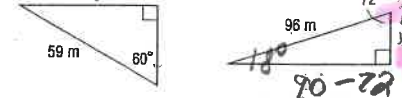
20. $\sin Y = \frac{15}{17}$
 $\angle Y = \sin^{-1}(\frac{15}{17}) = 47^\circ$

Calculate y, to the nearest hundredth of a metre.



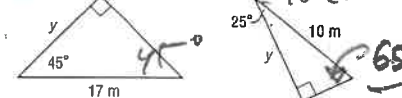
21. $\sin 54^\circ = \frac{y}{28}$
 $y = 22.67$ m

22. $\sin 30^\circ = \frac{y}{15}$
 $y = 7.5$ m



23. $\sin 60^\circ = \frac{y}{59}$
 $y = 51.10$ m

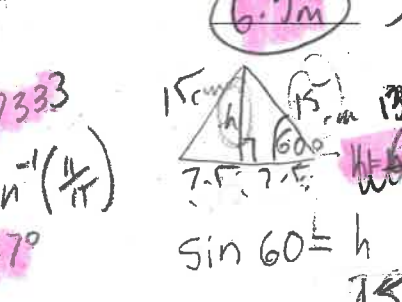
24. $\sin 72^\circ = \frac{y}{96}$
 $y = 90.25$ m



25. $\sin 45^\circ = \frac{y}{17}$
 $y = 12.02$ m

26. $\sin 25^\circ = \frac{y}{10}$
 $y = 4.23$ m

27. $\triangle KLM$ is an equilateral triangle. The length of each side of the triangle is 15 cm. Find the height of the triangle, to the nearest tenth of a centimetre.



$\sin 60^\circ = \frac{h}{15}$
 $h = 12.99$ cm

6.5 Right Triangles and the Cosine Ratio

MATPOWER™ Nine, pp. 242-244

A third example of a trigonometric ratio is the cosine ratio.

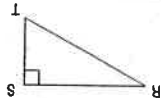
In a right triangle, the cosine ratio of an acute angle is defined as

side adjacent to the angle

hypotenuse

In $\triangle RST$, the cosine ratio of $\angle R$ is $\frac{RS}{RT}$

In $\triangle RST$, the cosine ratio of $\angle T$ is $\frac{RT}{ST}$



Use a calculator to find the cosine of each angle, to three decimal places.

- 23° 0.921
- 79° 0.191
- 30° 0.866
- 50° 0.643
- 43° 0.731
- 7° 0.993

Find $\angle E$, to the nearest degree.

- $\cos E = 0.982$ 8° $\cos E = 0.174$ 89°
- $\cos E = 0.454$ 63° $\cos E = 0.777$ 39°
- $\cos E = 0.999$ 3° $\cos E = 0.009$ 89°

Find $\angle V$, to the nearest degree.

- $\cos V = \frac{1}{7}$ 76° 29°
- $\cos V = \frac{11}{16}$ 48° 85°
- $\cos V = \frac{3}{2}$ 21° 63°
- $\cos V = \frac{15}{14}$ 18° $\cos V = \frac{13}{6}$ 63°

Calculate $\cos H$. Then, find $\angle H$, to the nearest degree.



$\cos H = \frac{4}{5} = 0.8$
 $\cos H = \frac{5}{13} = 0.385$

74 $\angle H = \cos^{-1}(\frac{4}{5}) = 37^\circ$

74 $\angle H = \cos^{-1}(\frac{5}{13}) = 67^\circ$

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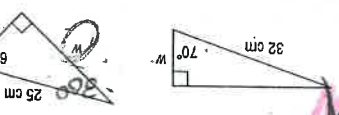
74 $\angle H = \cos^{-1}(\frac{5}{13}) = 67^\circ$

Calculate w , to the nearest tenth of a centimetre.

- $w = 11.4$ cm
- $w = 23.4$ cm
- $\cos 30^\circ = \frac{w}{17}$
- $\cos 48^\circ = \frac{17}{w}$
- $\cos 30^\circ = \frac{w}{27}$
- $\cos 30^\circ = \frac{w}{17}$
- $\cos 70^\circ = \frac{32}{w}$
- $\cos 60^\circ = \frac{25}{w}$



$\cos 30^\circ = \frac{w}{27}$
 $\cos 70^\circ = \frac{32}{w}$



$\cos 70^\circ = \frac{32}{w}$
 $\cos 30^\circ = \frac{w}{25}$

25. Find the distance from Dart to the clubhouse.



$D = 1.1$ km
 $\cos 54^\circ = \frac{1.6}{D}$

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6.6 Solving Right Triangles

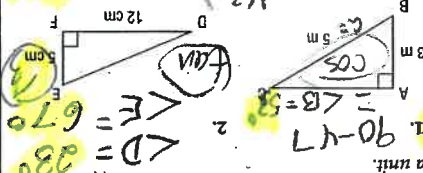
MATPOWER™ Nine, pp. 245-247

To solve a right triangle means to find all the unknown sides and all the unknown angles.

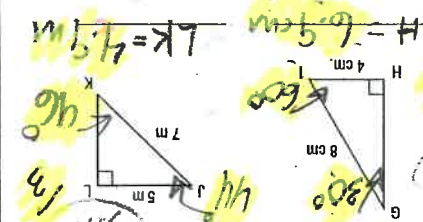
In order to solve a right triangle, you may use

- the Pythagorean Theorem
- the three trigonometric ratios, tangent, sine, and cosine
- the fact that the sum of the angles in a triangle is 180°

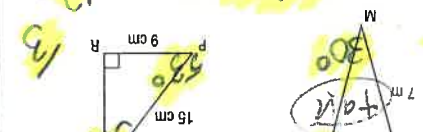
Find all the unknown angles, to the nearest degree, and all the unknown sides, to the nearest tenth of a unit.



$\angle C = \sin^{-1}(\frac{3}{5})$
 $\angle E = 67^\circ$
 $\angle D = 23^\circ$
 $\angle F = 67^\circ$



$\cos 30^\circ = \frac{4}{8}$
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MATPOWER™ Nine, pp. 242-244

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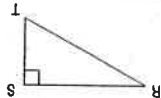
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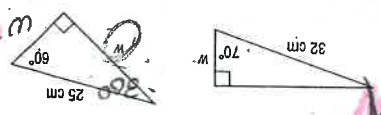
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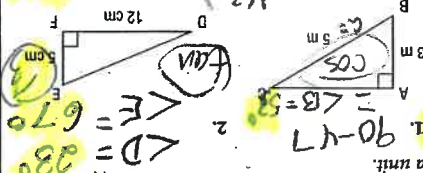
MATPOWER™ Nine, pp. 245-247

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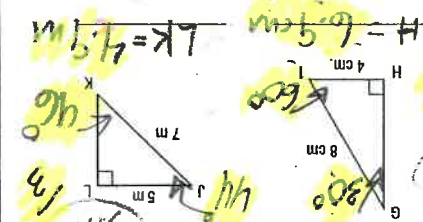
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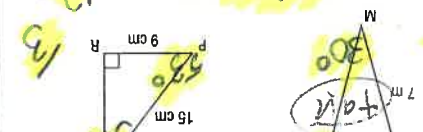
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 $\angle E = 67^\circ$
 $\angle D = 23^\circ$
 $\angle F = 67^\circ$



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6.6 Solving Right Triangles

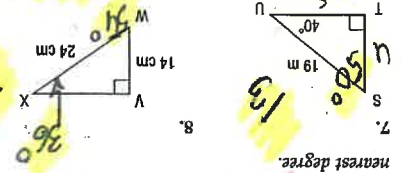
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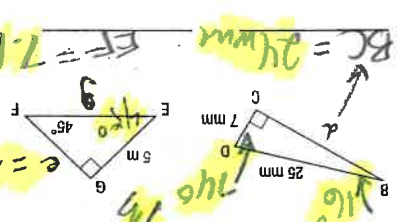
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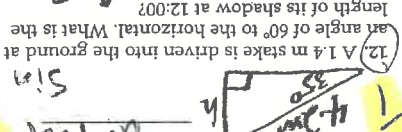
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