**TEACHER’S GUIDE**

**Unit**

**5**

**TRIGONOMETRY**

# KEY CONCEPTS

## Right-angled triangle

### In a right-angled triangle, the trigonometric ratios of acute angles are expressed as follows with reference to angle *θ*:

### 

C

hypotenuse

*θ*

sin *θ* =

cos *θ* =

tan *θ* =

opposite

*A* adjacent *B*

## Non-right-angled triangle

### For a non-right-angled triangle,

*b C*

*a*2 = *b*2 + *c*2 – 2*bc* cos *A*

**Sine rule**

**Cosine rule**

*A* = *ab* sin *C*

**Area of triangle**

= =

*A*

*a*

*c*

*B*

## Supplementary angles

### sin (180° – *θ*) = sin *θ* cos (180° – *θ*) = –cos *θ* tan (180° – *θ*) = –tan *θ*

***Negative angles*** sin (–*θ*) = –sin *θ* cos (–*θ*) = cos *θ* tan (–*θ*) = –tan *θ*

## Complementary angles

### sin (90° – *θ* ) = cos *θ* cos (90° – *θ* ) = sin *θ* tan (90° – *θ* ) =

**Casio ClassWiz Mathematics Workbook**

**TEACHER’S GUIDE**

## Trigonometric ratios of special angles

**TEACHER’S GUIDE**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***θ*** | **0°** | **30° ()** | **45° ()** | **60° ()** | **90° ()** |
| **sin *θ*** | 0 |  |  |  | 1 |
| **cos *θ*** | 1 |  |  |  | 0 |
| **tan *θ*** | 0 |  | 1 |  | N.A. |

***Trigonometric identities***

sin2 *A* + cos2 *A* = 1 sec2 *A* = 1 + tan2 *A* cosec2 *A* = 1 + cot2 *A*

## Addition formula

sin (*A* ± *B*) = sin *A* cos *B*± cos *A* sin *B*

cos (*A* ± *B*) = cos *A* cos *B*  sin *A* sin *B*

tan (*A* ± *B*) =

## Double angle formula

sin 2*A* = 2 sin *A* cos *A*

cos 2*A* = cos2 *A* – sin2 *A* = 2 cos2 *A* – 1 = 1 – 2 sin2 *A*

tan (2*A*) =

Unit 5 **Trigonometry**

# WORKED EXAMPLES

**TEACHER’S GUIDE**

**TEACHER’S GUIDE**

**Level 1**

## Worked Example 1

### Find the value of 6 tan 47.4°.

Solution

6 tan 47.4° = 6.525 (4 s.f.)

**ClassWiz steps**

Press 6l47.4=. 6.52495… is displayed.

***Worked Example 2***

Find the value of 3 cos 15° × 2 sin 43°.

Solution

3 cos 15° × 2 sin 43° = 3.953 (4 s.f.)

**ClassWiz steps**

Press (3k15)) (2j43))=.

3.95255… is displayed.

***Worked example 3***

Find the value of *θ* if sin *θ* = 0.8674.

Solution

sin *θ* = 0.8674

**ClassWiz steps**

Press qj for (sin–1).

Press (sin–1) 0.8674=. 60.157… is displayed.

*θ* = sin–1 0.8674

### = 60.2° (1 d.p.)

***Worked Example 4***

Find the value of *θ* if cos *θ* = .

### Solution

**ClassWiz steps**

Press qk for (cos–1). Press (cos–1) 5l12)P4).

74.591… is displayed.

cos *θ* =

*θ* = cos–1

### = 74.6° (1 d.p.)

**Casio ClassWiz Mathematics Workbook**

## Worked Example 5

### Find the value of sin *x* and cos *x* in the diagram.



4

*x*°

13

### Solution

sin *x* = sin (180° – x)=

 3

### cos *x* = –cos (180° – x) = –

The formula here may look slightly different from the one under Key Concepts. But they are actually the same. Simply express the trigonometric ratio of the **obtuse** angle to the trigonometric ratio of the **acute** angle using the supplementary angles and apply the TOA CAH SOH ratios.

**TEACHER’S GUIDE**

tan *x* = –tan (180° – x ) =

## Worked Example 6

### Find the value of *θ* if cos *θ* = –0.958.

Solution

To find an obtuse angle, the standard approach for all 3 trigonometric ratios is to find the basic angle first. Then use the basic angle to deduce the obtuse angle or other larger angles. The basic angle is

found by taking the inverse of the positive trigonometric ratio.

cos *θ* = –0.958

Basic angle = cos–1 (0.958)

= 16.7° (1 d.p.)

*θ* = 180° – 16.7°

= 163.3°

**Level 2**

***Worked Example 7***

Find the values of *x* and *y* in the diagram. *P*

*Q*

4

*x*° *y*°

2

9

*R*

*S*

### Solution

*S*

tan *x*° =

### *x*° = 26.565° = 26.6° (to 1 d.p.)

Answers for angles in degrees are always given to 1 decimal place.

cos (*x* + *y*)° =

(*x* + *y*)° = 63.612°

*y*° = 63.612° – 26.565° = 37.0° (1 d.p.)

Unit 5 **Trigonometry**

## Worked Example 8

**TEACHER’S GUIDE**

### Find the values of *x* and *y* in the diagram.

**TEACHER’S GUIDE**

*y P*

9

7 23°

12

*x*°

*R*

6

*Q*

### Solution

=

sin *x*° =

*S*

*x*° = sin–1

= 51.4° (to 1 d.p.)

The sine of both acute angles or obtuse angles gives a positive ratio value. Hence, when we take the inverse of sine, we need to discern whether the angle is acute or obtuse, and show our working accordingly. The calculator is designed

to give only the principal values and not the actual answers.

However, since angle *x* is clearly an obtuse angle from the diagram, then *x* = 180° – 51.4° = 128.6°. *y*2 = 92 + 72 – 2(9)(7) cos (180° – 128.6°)

*y* = 7.17 cm (3 s.f.)

***Worked Example 9***

It is given that cos *x* = – , where angle *x* is reflex. Without the use of a calculator, find the value of tan *x*.

Solution

Since the trigonometric ratio of cosine is negative and the angle is reflex, angle *x* is in quadrant 3.

By Pythagoras’ Theorem,



–3

*X*

91

10

=

tan *x* = –

## Worked Example 10

### Solve sin *x* = – for 0° ≤ *x* ≤ 360°.

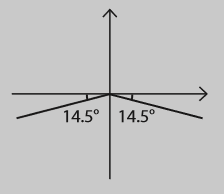
To find the basic angle, take the inverse of only the positive trigonometric ratio.

### Solution

### sin *x* = –

### Basic angle = sin–1 = 14.5°

*x* = 180° + 14.5° or 360° – 14.5°

14.5° 14.5°

*x* = 194.5° or 345.5°

Since sin *x* is negative, angle *x* is in quadrants 3 and 4.

### **CasioClassWiz Mathematics Workbook**

**CLASSWIZ WORKSHEETS**

# CLASSWIZ WORKSHEETS

**Level 1 **

### Find the value of the following, giving any non-exact answer correct to 3 significant figures.

**ClassWiz set-up**

Press L21 for the degree mode.

|  |  |  |
| --- | --- | --- |
| (a) sin 15° | (b) tan 39.2° | (c) cos 63.5° |
| (d) 7 tan 12.8° | (e) 19 cos 78.9° + 12 | (f) 0.48 sin 289° – 3.42 |
| (g) | (h) | (i) 9 sin 38° × 7 tan 21° |
| (j) 11 cos 188° × 5 tan 42.7° | (k) | (l) |

1. Find the value of the acute angle *θ*, in degrees, of each of the following, giving any non-exact answer to

**ClassWiz set-up**

Press L21 for the degree mode.

1 decimal place.

|  |  |  |
| --- | --- | --- |
| (a) sin *θ* = 0.5839 | (b) cos *θ* = 0.829 | (c) 2 tan *θ* = 3.062 |
| (d) 3 cos *θ* = 2.447 | (e) 17 sin *θ* + 8 = –7 | (f ) 6 tan *θ* – 11 = 25 |
| (g) = 4.21 | (h) = 5.73 | (i) = |
| (j) = 11 | (k) tan *θ =* | (l) sin *θ =* |

Unit 5 **Trigonometry**

### Find the value of *x* in each of the following diagrams, giving any non-exact answer correct to 3 significant figures. All lengths are given in centimetres.



**ClassWiz set-up**

Press L21 for the degree mode.

**CLASSWIZ WORKSHEETS**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| (a) |  |  | *x*  60° | (b) | 2.7 | 71° | *x* |
| (c) |  |  |  | (d) |  |  | |
|  | 6 |  | 40° |  | 21° |  | |
|  |  |  |  |  |  | *x* | |
|  |  | *x* |  |  | 11 |  | |

1. Find the value of *x* in each of the following diagrams, giving any non-exact answer correct to 3 significant figures. All lengths are given in centimetres and angles are given in radians.

**ClassWiz set-up**

Press L22 for the radian mode.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| (a) *x*  *π*  5 | | 9 | | (b) |  | *π*  4  *x* | 3 |
| (c) |  |  |  | (d) |  |  |  |
|  | 0.436 |  | 3 |  | *π* | 1.27 | *x* |
|  |  | *x* |  |  |  |  |  |

**Casio ClassWiz Mathematics Workbook**

**CLASSWIZ WORKSHEETS**

### Find the value of the acute angle *θ*, in degrees, of each of the following triangles, giving your answer correct to 1 decimal place when the answer is non- exact. All lengths are in centimetres.

**ClassWiz set-up**

Press L21 for the degree mode.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| (a) *B*  *C θ*  6 *A* | | | | (b) | *A* | 4 | *θ*  *B* | 2 | *C* |
| (c) |  | 16 | *θ* | (d) | 5 *π* | | *θ* | 18 *π* | |

Unit 5 **Trigonometry**

### Find the value of the acute angle *θ*, in radians, of each of the following triangles, giving your answer correct to 3 significant figures when the answer is non-exact. All lengths are given in centimetres.

**ClassWiz set-up**

Press L22 for the radian mode.

**CLASSWIZ WORKSHEETS**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| (a) | 17 |  | 5  *θ* | (b) | *θ* |  | 3 | 7 |
| (c) |  |  |  | (d) |  | |  | |
|  | 91 |  |  |  |  | |  | |
|  |  |  |  |  |  | | *θ* | |
|  |  |  | *θ* |  |  | |  | |
|  |  |  |  |  |  | | 23 | |
|  |  | 72 |  |  |  | |  | |
|  |  |  |  |  | 7 | |  | |

**Casio ClassWiz Mathematics Workbook**

**CLASSWIZ WORKSHEETS**

### Find the area of each of the following triangles, giving your answer correct to 3 significant figures when the answer is non-exact. All lengths are given in centimetres.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| (a)  Teachers: Take note that there are 2 parts that use the radian for computation. Please advise your students to change the mode of the calculator accordingly. | |  | |  | (b) |  |  |
| 7 | 98° | | 9 | |  | 33 1.24 | 64 |
| (c) |  | |  | | (d) |  |  |
| 31° |  | |  | |  | 50°  19.7 | 35.8 |
| 13 |  | |  | |  |  |  |
|  | 18 | |  | |  |  |  |
| (e) 16 | | | | | (f ) |  |  |
| 0.69 *π* | | | | |  | 28° |  |
|  | | | | |  | 8 |  |
| 17 | | | | |  |  |  |
|  | | | | |  | 3 |  |

Teachers: Take note that there are 2 parts that use the radian for computation. Please advise your students to change the mode of the calculator accordingly.

Unit 5 **Trigonometry**

### Solve for the unknown *x* in each of the following triangles, giving your answer correct to 3 significant figures for lengths and 1 decimal place for angles (°) when the answer is non-exact. All lengths are given in centimetres.



**ClassWiz set-up**

Press L21 for the degree mode.

**CLASSWIZ WORKSHEETS**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| (a) | | | | | (b) |  |  | 18 |  |  |
|  | | | | |  | 45° |  |  |  |  |
| 26 | | | | |  | 111° |  |  | *x* |  |
| 123° | *x* |  |  |  |  |  |  |  |  |  |
| 40° | | | | |  |  |  |  |  |  |
| (c) | |  |  |  | (d) |  |  |  |  |  |
| 22° | |  | 55° | *x* |  | 8 |  | *x*° |  |  |
|  | |  |  |  |  |  |  |  |  | 60° |
|  | |  |  |  |  |  | 9 |  |  |  |
| (e) | |  |  |  | (f ) |  |  |  |  |  |
| 8 | | 8.1 |  |  |  |  |  | 17° |  |  |
|  | |  |  |  |  |  |  |  |  |  |
| 63° | | *x*° |  |  |  |  |  |  |  |  |
|  | |  |  |  |  | *x*° |  |  |  |  |
|  | |  |  |  |  |  |  |  |  |  |

**Casio ClassWiz Mathematics Workbook**



**CLASSWIZ WORKSHEETS**

### Solve for the unknown *x* in the following triangles, giving your answers to 3 significant figures for lengths and 1 decimal place for angles (°) when the answer is non-exact. All lengths are given in centimetres.

**ClassWiz set-up**

Press L21 for the degree mode.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| (a) *x* | | | | (b) | | | | | | |
|  | | | |  | *x* |  |  |  |  | 17 |
| 7 | 76° | 9 |  |  |  |  |  | 11 |  | 76° |
| (c) | | |  | (d) 7.6 | | | | | | |
| 6 | | | *x* |  |  | 5 | *x*° |  |  | 10.2 |
| 63° | | |  |  | | | | | | |
| 5 | | |  |  | | | | | | |
| (e) 12  6 *x*° | | | | (f ) |  |  |  | *x*° | 3 |  |
| 16 | | | | 9 | | | | | | |
|  | | | | 7 | | | | | | |

Unit 5 **Trigonometry**

### Find the value of sin *x* and cos *x* in each of the following triangles. All lengths are given in centimetres.

**CLASSWIZ WORKSHEETS**

Teachers: Warn students to proceed with caution. Ask: Is the given triangle a right-angled triangle? How may the students determine whether there is a right-angled triangle? \*Hint: Converse of Pythagoras’ Theorem.



|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| (a) |  | *x*° |  | 13  12 | 5 | (b) | | 4  *x*° | |  | 4 | 8 |
| (c) |  |  | |  | | | (d) | |  |  | | | |
|  |  | 3 | |  | | |  | |  |  | | | |
|  | 4 |  | | *x*° | | |  | |  |  | | | |
|  |  |  | |  | | |  | | *x*° |  | | | |
|  |  |  | |  | | |  | |  |  | | | |
|  |  |  | |  | | |  | |  | 4 | | | |

**Casio ClassWiz Mathematics Workbook**

**CLASSWIZ WORKSHEETS**

### From the following trigonometric equations, find the value of the obtuse angle *x* using the basic angle.

**ClassWiz set-up**

Press L21 for the degree mode.

|  |  |
| --- | --- |
| (a) cos *x* = –0.468 | (b) sin *x* = 0.663 |
| (c) –5 cos *x* = 4 | (d) 8.3 sin *x* – 1 = 6.4 |

1. Use your calculator to evaluate each of the following special angles.

**ClassWiz set-up**

Press L21 for the degree mode.

|  |  |
| --- | --- |
| (a) sin 45° + cos 30° | (b) tan 30° – cos 60° |
| (c) –sin 60° + tan 45° | (d) tan 15° × cos 75° |
| (e) cos 15° × sin 105° | (f) |

Unit 5 **Trigonometry**

# Level 2

**CLASSWIZ WORKSHEETS**

### 1. Find the values of *x* and *y* in each of the following diagrams, giving your answers correct to 3 significant figures for lengths and 1 decimal place for angles (°) when the answer is non-exact. All

lengths are given in centimetres.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| (a) *A*  5  *B* | 72° |  |  | *y D*  *x*  *C* | (b) | *x* | 50° |  | | *y* |  | |
| (c) |  | |  |  | (d) |  | | |  |  | |  |
|  | 27 | |  | 58° |  |  | | | *y* |  | |  |
|  | *x* | |  |  |  |  | | |  | *x* | |  |
|  |  | |  | *y*° |  | 42° | | |  |  | | 55° |
|  |  | |  |  |  |  | | |  |  | | 13 |
|  |  | | 35 |  |  |  | | |  |  | |  |

**Casio ClassWiz Mathematics Workbook**



**CLASSWIZ WORKSHEETS**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| (e)  *y*  *x* | 12°  21 | 32° | (f ) | 7 | 15 | *y*°  12  *x* | | | |
| (g) 5 |  | | (h) | *x* | | 18 | 30° | *y*° | 15 |
| *x* | *y* | |
| 35°  50° |  | |

Unit 5 **Trigonometry**



### 2. Find the values of *x* and *y* in each of the following diagrams, giving your answers correct to 3 significant figures for lengths and 1 decimal place for angles (°) when the answer is non-exact. All

**CLASSWIZ WORKSHEETS**

lengths are given in centimetres.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| (a) | 6 | *x*° | 21°  8 | | 20 | *y* | (b) | 15 |  | *y*°  18  *x* | | 130° | | 6 |
| (c) 15 | | | | | | | (d) 25  68°  80°  *x*  30°  28 | | | | | | | *y* |
|  | | | 29 |  | *x* | *y*° |
| 25° | | | | | | |
| 12 | | | | | | |
| (e) 14 | | | | | | | (f ) | 28 | | 32 | *x*°  75° | 20 | 15 | *y* |
| 16 | | |  | 120° |  |  |
| *x* | | | | | | |
| 100° | | | | | | |
| *y* | | | | | | |
| 50° | | | | | | |

**Casio ClassWiz Mathematics Workbook**

### It is given that sin *x* = , where angle *x* is obtuse. Without the use of a calculator, find the value of

tan *x* + cos *x*.



**CLASSWIZ WORKSHEETS**

1. Given that sin *A* = *k* and *A* is obtuse, find the value of tan (90° – *A*).
2. Given that tan *A* = – and tan *A* and cos *A* have opposite signs, find the value of cos *A* – sin (–*A*).
3. It is given that cos *x* = and sin *x* and cos *x* have opposite signs. Without the use of a calculator,

evaluate tan (*x* – 90°).

1. Given that sin *θ* = *m*, where *θ* is an acute angle, find, in terms of *m*, tan (–*θ*) – cos (–*θ*).
2. Given that cos *x* = *k*, where *x* is reflex and *k* < 0, find cos (90° – *x*) + tan (–*x*).

Unit 5 **Trigonometry**

### It is given that tan *x* = and 90° < *x* < 360°. Without the use of a calculator, evaluate

**CLASSWIZ WORKSHEETS**

cos (180° – *x*) – sin *x*.



10. Solve cos *x* = for 0° ≤ *x* ≤ 360°.



11. Solve cos *x* = –0.835 for –180° ≤ *x* ≤ 180°.



12. Solve tan *x* = 5.72 for –*π* ≤ *x* ≤ *π*.



13. Solve 2 sin *θ* = for 0 < *θ* < *π*.



14. Solve 5 tan *x* + 7 = 1 for 0° < *x* < 360°.

**Casio ClassWiz Mathematics Workbook**



**CLASSWIZ WORKSHEETS**

### 15. Solve 3 sin *x* = cos 65° for 0° < *x* < 180°.

16. Solve 7 cos *θ* + 9.3 = 4.83 for –2*π* ≤ *θ* ≤ 2*π*.

17. Solve + 5 = 3 for 0 < *x* < 2*π*.

### 18. Solve 5 tan 3*θ* + 8 = 3 for 0° < *θ* < 180°.

1. Solve sin 2*θ* = for 0 < *θ* < 2*π*.

### Solve 3 sin *x* = 2 cos *x* for 0 ° ≤ *x* ≤ 360°.

1. Solve cosec 2*x* = 5 for 0° < *x* < 180°.

Unit 5 **Trigonometry**

### 22. Solve 7 sec *θ* + 11 = 0 for –*π* < *θ* < *π*.

**CLASSWIZ WORKSHEETS**



23. Solve 7 tan *θ* = 3 sec *θ* for – < *θ* <.

24. Solve sec2 *θ* + 2 tan *θ* = 0 for *π* < *θ* < 3*π*.



25. Solve –sin2 *θ* – 3 cos *θ* + 3 = 0 for –180° ≤ *θ* ≤ 180°.



26. Solve 3 sec2 *x* – 8 tan *x* – 1 = 0 for 0 < *x* < 2*π*.



27. Solve cosec2 2*θ* + 5 cot 2*θ* + 2 = 0 for – < *θ* < .

**Casio ClassWiz Mathematics Workbook**

# Level 3

### In the figure, ∆*ABC* is congruent to ∆*BDE*. Angle *ABC* and angle *BED* are 90° and 70° respectively, *AB* = 12 cm. Find

* 1. angle *BAC*. *A*

*E*

70°

### the length of *CD*.

12 cm

*B C D*

1. In ∆*XYZ*, *XZ* = 26 cm and sin *XZY* = .*M* is a point produced from *YZ*.

### Find the length of *XY*. *X*

26 cm

*Z*

* 1. Find the value of angle *XZY.*
  2. Find the value of cos *XZM*. *M*

*Y*

### In the diagram, triangle *ABC* is a right-angled triangle and sin *ACB* = .

Find the numerical value of

(a) cos (180° – *CAB*).

1. sin (90° – *ACB*).
2. tan *ACB*.

*C*



**CLASSWIZ WORKSHEETS**

*A B*

Unit 5 **Trigonometry**

### 4. In the diagram, ∆*ABC* is a triangular field in which *AB* = 17 m, *BC* = 8 m and *AC* = 15 m.

**CLASSWIZ WORKSHEETS**

1. Determine whether ∆*ABC* is a right-angled triangle. *A*
2. Find the area of ∆*ABC*.

17

15

8

1. Find the shortest distance from *C* to *AB*.

*B*

*C*

### The diagram shows a trapezium field *ABCD* where *AB* // *DC*, *AB* = 20 m, *DC* = 38 m and *AD* = 21 m. **Given that *ADC* = 52, find**



* 1. *BX*.
  2. *CX.*
  3. angle *BCX*.

*A* 20 m *B*

*D C*

21 m

52°

38 m *X*

### In the diagram, *ABD* is a right angled triangle and *C* is a point on *BD* such that *AC* = 7 cm, *CD* = 9 cm and *AD* = 13 cm.



* 1. Calculate the value of cos *ACD*. *A*

13

7

* 1. Find the length of *BC*.
  2. Find the area of triangle *ACD*.

*B C* 9 *D*

**Casio ClassWiz Mathematics Workbook**

### It is given that cos *A* = and sin *B* = – and both *A* and *B* are in the same quadrant. Without the use

of a calculator, evaluate

(a) cot (90° – *B*).

(b) cosec (180° – *A*).

1. (a) Prove that + = 2 sec *x* .

(b) Hence solve + = 5 cosec *x* for 0° < *x* < 360°.

### Given that tan (*A* + *B*) = and tan *B* = , find the value of tan *A* by using the Addition Formula.



**CLASSWIZ WORKSHEETS**

1. Solve 3 cos 2*x* = 5 cos *x* – 4 for 0 < *x* < 2*π* by using the Double Angle Formula.

**Level 4**

Unit 5 **Trigonometry**

### During National Day celebrations, a string of flags was hung from the top of a vertical building at point *X* to the top of a wall at point *Y*. The wall is 4 m in height and stands 32 m away from the

**CLASSWIZ WORKSHEETS**

building horizontally. *M* is a point on the building such that it is perpendicular to the top of the wall. Given that the string of flags measures 49 m in length,

* 1. find angle *XYM*.
  2. hence find the height of the building.

*X*

49 m

vertical building

*Y*

4 m

wall

*M*

32 m

**Casio ClassWiz Mathematics Workbook**

**CLASSWIZ WORKSHEETS**

### The diagram shows a horizontal field *PQRS*, where *Q* is due east of *P* and a building of height 55 m is standing at *R*. It is given that *PR* = 18 m, *PS* = 45 m, angle *QPR* = 60°, angle *PQR* = 20° and the bearing of *S* from *P* is 245°.

*Q*

*N*

*R*

20°

18 m

60°

*P*

45 m

*S*

### Calculate

* 1. the bearing of *Q* from *R*.
  2. distance *PQ*.
  3. distance *RS*.
  4. the shortest distance from *R* to *PQ*.
  5. the greatest angle of elevation from a point on *PQ* to the top of the building at *R*.

Unit 5 **Trigonometry**

### On the map, Kenny’s house is located at Spanish Terrace, *C*, and he studies in School *A*. At the end of the school day, he would walk to Restaurant *B* to buy his dinner before walking back home. On the weekends, John would head to the Hollywood Mini Mart, *D*, to buy some groceries.

**CLASSWIZ WORKSHEETS**



*C*

*N*

Restaurant B

*B*

*D*

540 m

570 m

490 m

65.38°

*A*

School A

Spanish Terrace, Kenny’s house

Hollywood Mini Mart

* 1. It is given that *AB* = 570 m, *AC* = 540 m, *AD* = 490 m, angle *BAC* = 65.38, angle *CDA* = 90 and the bearing of *C* from *B* is 079.2. Find
     1. the distance between Restaurant *B* and Kenny’s house.
     2. angle *BCA*.

### the bearing of School *A* from Kenny’s house.

* 1. Find the value of.
  2. Hence state the value of .

**Casio ClassWiz Mathematics Workbook**

1. *Q N*

*P*

48 m

*S*

*R*

125 m

### *PQRS* is a trapezoidal piece of land where *PS* is parallel to *QR*, *PS* = 48 m, *SR* = 125 m and *QR* = 3*PS*. *R* is due east of *S* and the bearing of *Q* from *R* is 320°.

**CLASSWIZ WORKSHEETS**

1. Calculate angle *PSR*.
2. Calculate *PR*.
3. (i) Calculate the area of *PSR*.

(ii) Hence calculate the area of *PQRS*.

1. The base of a vertical pole is at *P*. The angle of elevation of the top of the pole from *S* is 58°. Calculate the angle of elevation of the top of the pole from *R*.

Unit 5 **Trigonometry**

### (a) Prove that cos *A* + (sin 2*A* + cos *A*)(1 – 2 sin *A*)  2 cos *A* cos 2*A*.

**CLASSWIZ WORKSHEETS**

(b) Find all the angles between 0° and 180° that satisfy the equation cos *A* + (sin 2*A* + cos *A*)(1 – 2 sin *A*) = .