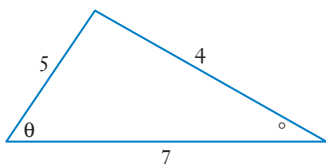


Practice set 2



In Questions 1 to 6, select the correct answer **A**, **B**, **C** or **D**.

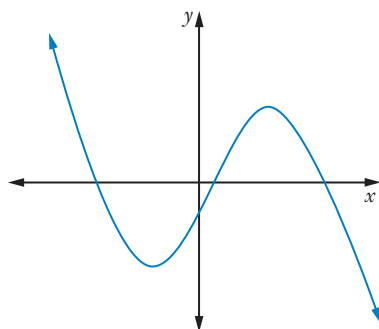
- 1 Find an expression involving θ for this triangle (there may be more than one answer).



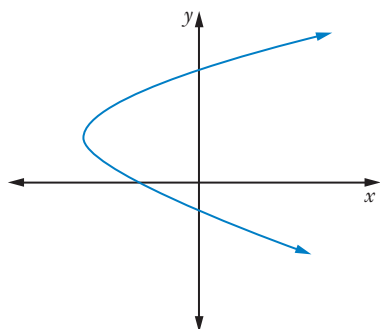
- A** $\cos \theta = \frac{5^2 + 4^2 - 7^2}{2 \times 5 \times 4}$ **B** $\frac{\sin \theta}{4} = \frac{\sin \alpha}{5}$
- C** $\frac{\sin \theta}{5} = \frac{\sin \alpha}{4}$ **D** $\cos \theta = \frac{5^2 + 7^2 - 4^2}{2 \times 5 \times 7}$
- 2 If $f(x) = \begin{cases} 8x^3 & \text{if } x > 3 \\ 3x^2 - 2 & \text{if } 0 \leq x \leq 3 \\ 9 & \text{if } x < 0 \end{cases}$ evaluate $f(3) + f(1) + f(-1)$.
- A** 35 **B** 226 **C** 233 **D** 53
- 3 The linear function with equation $4x - 2y + 3 = 0$ has:
- A** gradient -2 , y -intercept $-1\frac{1}{2}$ **B** gradient $\frac{1}{2}$, y -intercept $\frac{3}{4}$
- C** gradient 2 , y -intercept $1\frac{1}{2}$ **D** gradient 4 , y -intercept 3 .
- 4 For the quadratic function $y = ax^2 + bx + c > 0$ for all x :
- A** $a > 0, b^2 - 4ac > 0$ **B** $a < 0, b^2 - 4ac > 0$
- C** $a > 0, b^2 - 4ac < 0$ **D** $a < 0, b^2 - 4ac < 0$

5 Which of the following is not the graph of a function?

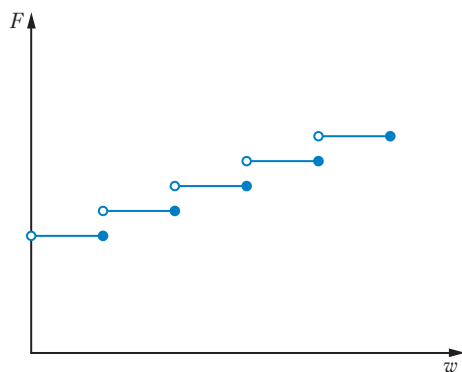
A



B



C



D $(0, 3), (1, 3), (2, 5), (3, 1)$

6 The polynomial $P(x) = x^3 - 5x^2 + 3x - 8$ (there is more than one answer):

A is monic

B has degree 3

C has leading coefficient -8

D has constant term -8 .

7 A triangle has sides of length 5.1 m, 6.5 m and 8.2 m.

a Find the size of the angle opposite the 6.5 m side, correct to the nearest minute.

b Find the area of the triangle correct to one decimal place.

8 Find the equation of the straight line:

a with gradient -2 and y -intercept 3

b with x -intercept 5 and y -intercept -1

c passing through $(2, 0)$ and $(-3, -4)$

d through $(5, -4)$ and parallel to the line through $(7, 4)$ and $(3, -1)$

e through $(3, -1)$ perpendicular to the line $3x - 2y - 7 = 0$

f through $(1, 2)$ parallel to the line through $(-3, 4)$ and $(5, 5)$

g through $(1, 3)$ and an angle of inclination of 135° .

9 Simplify:

a $\frac{6x}{2x-8}$

b $\frac{5y+10}{xy^2} \div \frac{y^2-4}{x^2y}$

c $\frac{4a-3}{5} - \frac{a+1}{4}$

10 Convert these angles into radians in terms of π :

a 60°

b 150°

c 90°

d 10°

e 315°

11 Sketch the graph of:

a $5x - 2y - 10 = 0$

b $x = 2$

c $f(x) = (x-3)^2$

d $y = x^2 - 5x + 4$

e $y = (x-1)^3 + 2$

12 Convert each value in radians into degrees and minutes:

a 1.7

b 0.36

c 2.54

13 The lines AB and AC have equations $3x - 4y + 9 = 0$ and $8x + 6y - 1 = 0$ respectively.

a Show that the lines are perpendicular.

b Find the coordinates of A .

14 Find the gradient of the line through the origin and $(-3, 5)$.

15 If $g(x) = \begin{cases} 3-x & \text{if } x > 1 \\ 2x & \text{if } x \leq 1 \end{cases}$:

a find $g(2)$ and $g(-3)$

b sketch the graph of $y = g(x)$.

16 Find the value of x if $f(x) = 7$ where $f(x) = 2^x - 1$.

17 If $f(x) = 9 - 2x^2$, find the value of $f(-1)$.

18 Show that $3x - 4y + 10 = 0$ is a tangent to the circle $x^2 + y^2 = 4$.

19 Change each value in radians into degrees:

a $\frac{\pi}{4}$

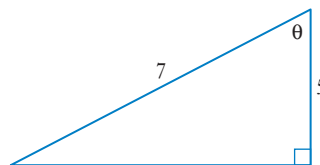
b $\frac{3\pi}{2}$

c $\frac{\pi}{5}$

d $\frac{7\pi}{8}$

e 6π

20 Given the triangle ABC , find exact values of $\cos \theta$, $\sin \theta$ and $\tan \theta$.

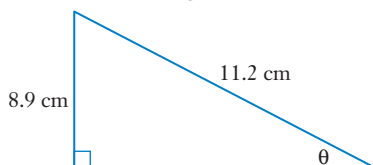


21 Show that:

a $-x^2 + x - 9 < 0$ for all x

b $x^2 - x + 3 > 0$ for all x .

- 22** The distance travelled by a runner is directly proportional to the time she takes. If Vesna runs 12 km in 2 hours 30 minutes, find:
- a** an equation for distance d in terms of time t
 - b** how far Vesna runs in:
 - i** 2 hours
 - ii** 5 hours
 - c** how long it takes Vesna to run:
 - i** 30 km
 - ii** 19 km
 - d** her average speed.
- 23** Find the equation of the parabola with x -intercepts 3 and -1 and y -intercept -3 .
- 24** Show that the quadratic equation $6x^2 + x - 15 = 0$ has 2 real, rational roots.
- 25** The area of a circle is 5π and an arc 3 cm long cuts off a sector with an angle of θ subtended at the centre. Find θ in degrees and minutes.
- 26** A soccer goal is 8 m wide. Tim shoots for goal when he is 9 m from one post and 11 m from the other. Within what angle must a shot be made in order to score a goal?
- 27** Evaluate θ in degrees and minutes, to the nearest minute:



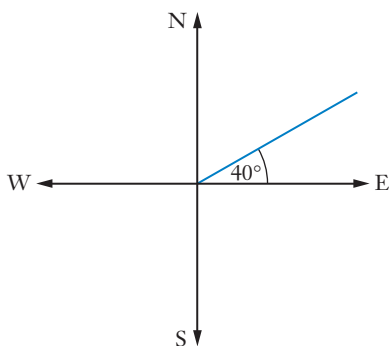
- 28 a** Find the equation of the straight line l through $(-1, 2)$ that is perpendicular to the line $3x + 6y - 7 = 0$.
- b** Line l cuts the x -axis at P and the y -axis at Q . Find the coordinates of P and Q .
- 29** Show that $f(x) = x^6 - x^2 - 3$ is an even function.
- 30** Find the angle of depression from the top of a 5.6 m tall cliff down to a boat that is 150 m out from the base of the cliff.

31 Write each direction shown as:

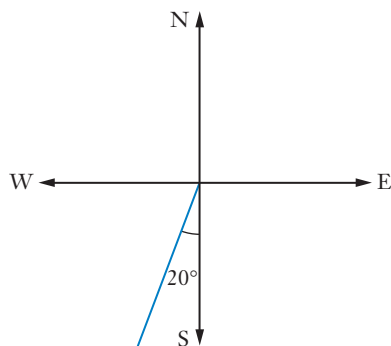
i a compass bearing

ii a true bearing

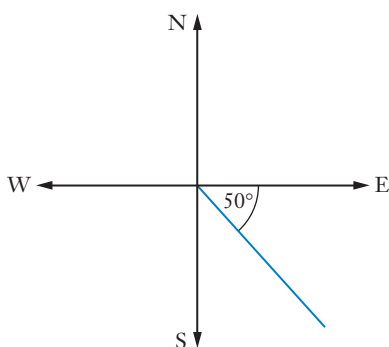
a



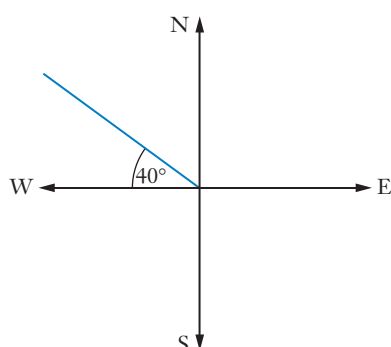
b



c



d



32 An angle of 30° is subtended at the centre of a circle with radius 5 cm. Find the exact:

a arc length

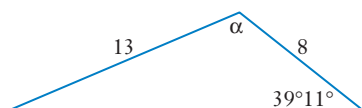
b area of the sector.

33 Factorise:

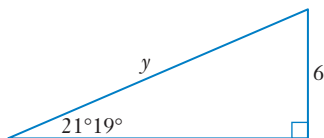
a $x^2 - 4x + 4$

b $9x^2 - 1$

34 Find α in degrees and minutes.



- 35** Find the value of y correct to 3 significant figures:



- 36** Find the intersection of the graphs:

a $x + 3y - 1 = 0$ and $x - 2y - 6 = 0$

b $y = x^2$ and $x - 2y + 15 = 0$

- 37** For each quadratic function:

i find the equation of the axis of symmetry

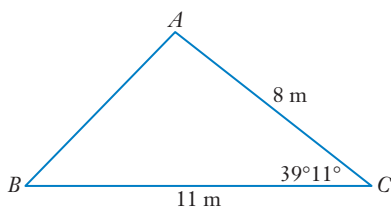
ii state whether it has a maximum or minimum turning point and find its coordinates.

a $y = x^2 - 6x + 1$

b $y = -2x^2 - 4x - 3$

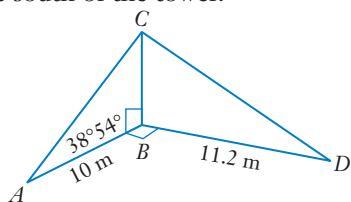
- 38** A hawk at the top of a 10 m tree sees a mouse on the ground. If the angle of depression is $34^\circ 51'$, how far, to 1 decimal place, does the bird need to fly to reach the mouse?

39



- a** Find AB , to the nearest metre.
- b** Find the area of $\triangle ABC$, to 3 significant figures.
- 40** Two points A and B are 100 m apart on the same side of a tower. The angle of elevation of A to the top of the tower is 20° and the angle of elevation from B is 27° . Find the height of the tower, to the nearest metre.
- 41** The length of an arc in a circle of radius 6 cm is 7π cm. Find the area of the sector cut off by this arc.
- 42** Jordan walks for 3.1 km due west, then turns and walks for 2.7 km on a bearing of 205° . How far is he from his starting point?

- 43** The angle of elevation from a point A to the top of a tower BC is $38^\circ 54'$. A is 10 m due south of the tower.



- a** Find the height of the tower, to 1 decimal place.
- b** If point D is 11.2 m due east of the tower, find the angle of elevation from D to the tower.
- 44** Find the domain and range of:
- a** $f(x) = \frac{3}{x+4}$ **b** $y = |x| + 2$
- c** $y = 4$ **d** $y = x^2 - 3$
- 45** Nalini leaves home and cycles west for 12.5 km then turns and rides south for 11.3 km.
- a** How far is Nalini from home?
- b** Find the bearing of Nalini from home.
- 46** Show that $f(x) = x^3 - 5x$ is an odd function.
- 47** Sketch the graph of:
- a** $3x - 2y + 6 = 0$ **b** $y = x^2 - x - 2$
- c** $y = x^3 - 1$ **d** $y = x(x+2)(x-3)$
- 48** The length of an arc in a circle of radius 2 cm is 1.6 cm. Find the area of the sector.
- 49** Change each angle size from radians into degrees.
- a** 2π **b** $\frac{\pi}{6}$ **c** $\frac{9\pi}{4}$
- 50** A plane flies on a bearing of 034° from Sydney for 875 km. How far due east of Sydney is the plane?
- 51** Solve:
- a** $5b - 3 \geq 7$ **b** $x^2 - 3x = 0$ **c** $|2n + 5| = 9$