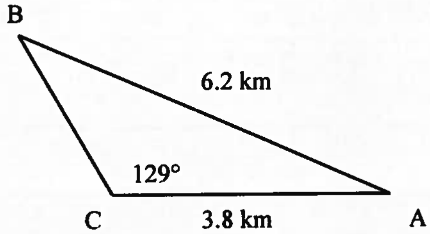
In ΔSTU, the shrubs triangle, the unknown sides are 3.0 m and 2.7 m, to the nearest tenth of a metre. The unknown angle is 55°, to the nearest degree.

Chapter 2 Practice Test Page 130 Question 17



First use the sine law to determine ∠B. then, use it again to determine the distance CB.

$$\frac{\sin B}{3.8} = \frac{\sin 129°}{6.2}$$

$$\sin B = \frac{3.8 \sin 129°}{6.2}$$

$$\angle B = \sin^{-1}\left(\frac{3.8 \sin 129°}{6.2}\right)$$

$$\angle B = 28.445...$$

Then, $\angle A = 180° - (129° + 28°)$

$$\angle A = 23°$$

$$\frac{BC}{\sin 23°} = \frac{6.2}{\sin 129°}$$

$$BC = \frac{6.2 \sin 23°}{\sin 129°}$$

$$BC = 3.117...$$

Before losing contact with the Alpha group, the Beta group can walk 3.1 km, to the nearest tenth of a kilometre.

Cumulative Review, Chapters 1–2

Cumulative Review Page 133 Question 1

a) **A** 3, 7, 11, 15, 19, …is an arithmetic sequence with $t_1 = 3$ and $d = 4$.

b) **D** 1, 3, 9, 27, 81, … is a geometric sequence with $t_1 = 1$ and $r = 3$.

c) **E** is an arithmetic series with $t_1 = 2$ and $d = 3$.

d) **C** is a geometric series with $t_1 = 1$ and $r = 2$.

e) **B** is a convergent series with $t_1 = 5$ and $r = \frac{1}{5}$.

Cumulative Review Page 133 Question 2

a) 27, 18, 12, 8, ... is a geometric sequence because successive terms have a common ratio. The common ratio is $\frac{18}{27}$ or $\frac{2}{3}$. The next three terms are $\frac{16}{3}$, $\frac{32}{9}$, $\frac{64}{27}$.

b) 17, 14, 11, 8,... is an arithmetic sequence because successive terms have a common difference of −3. The next three terms are 5, 2, −1.

c) −21, −16, −11, −6, ... is an arithmetic sequence because successive terms have a common difference of 5. The next three terms are −1, 4, 9.

d) 3, −6, 12, −24, ... is a geometric sequence because successive terms have a common ratio. The common ratio is −2. The next three terms are 48, −96, 192.

Cumulative Review Page 133 Question 3

a) Substitute $t_1 = 18$ and $d = -3$ into $t_n = t_1 + (n - 1)d$.
$t_n = 18 + (n - 1)(-3)$
$t_n = 21 - 3n$

b) Substitute $t_1 = 1$ and $d = \frac{3}{2}$ into $t_n = t_1 + (n - 1)d$.

$$t_n = 1 + (n-1)\frac{3}{2}$$

$$t_n = \frac{3}{2}n - \frac{1}{2}$$

Cumulative Review Page 133 Question 4

Substitute $t_1 = 2$, $r = -2$, and $n = 20$ into $t_n = t_1r^{n-1}$.
$t_{20} = 2(-2)^{19}$
$t_{20} = -1\ 048\ 576$

Cumulative Review Page 133 Question 5

a) First find t_1. Substitute $d = 3$, $n = 12$, and $t_{12} = 31$ into $t_n = t_1 + (n - 1)d$.
$31 = t_1 + (12 - 1)3$
$31 - 33 = t_1$
$t_1 = -2$

Now substitute into $S_n = \frac{n}{2}(t_1 + t_n)$.

$S_{12} = \frac{12}{2}(-2+31)$

$S_{12} = 174$

b) First find r. Substitute $t_{10} = 78\ 732$ and $t_1 = 4$ into $t_n = t_1r^{n-1}$.

$78\ 732 = 4(r^9)$

$r^9 = 19\ 683$

$r = \sqrt[9]{19\ 683}$

$r = 3$

Now substitute into $S_n = \frac{t_1(r^n - 1)}{r - 1}$.

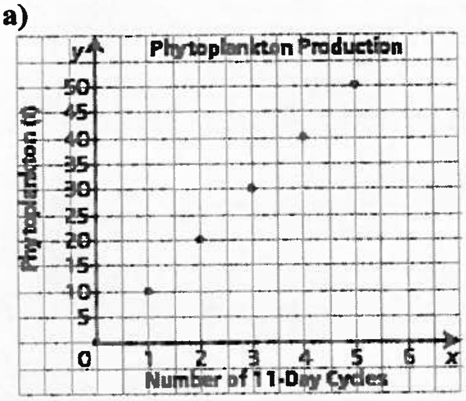
$S_5 = \frac{4(3^5 - 1)}{3 - 1}$

$S_5 = 2(242)$

$S_5 = 484$

Cumulative Review Page 133 Question 6

a)



b) $t_n = 10n$, where n is the number of 11-day cycles.

c) The coefficient 10 is the slope of the linear function.

Cumulative Review Page 133 Question 7

$h = 5.8 + 61(3.2)$

$h = 201$

The building is 201 m tall.

Cumulative Review Page 134 Question 8

a) $t_1 = \frac{9}{10}$ and $r = \frac{1}{10}$

$$S_\infty = \frac{t_1}{1-r}$$

$$S_\infty = \frac{\frac{9}{10}}{1-\frac{1}{10}}$$

$$S_\infty = \frac{\frac{9}{10}}{\frac{9}{10}}$$

$$S_\infty = 1$$

b) Answers may vary. In a way they are both correct.

Cumulative Review Page 134 Question 9

Substitute $x = -2$ and $y = 4$ into $r^2 = x^2 + y^2$.

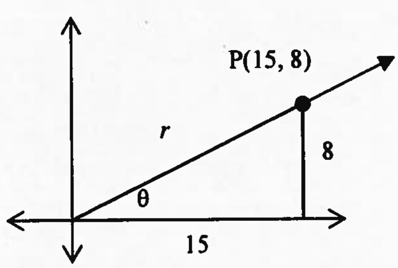
$r^2 = (-2)^2 + (4)^2$

$r^2 = 4 + 16$

$r = \sqrt{20}$ or $2\sqrt{5}$

The exact distance from the origin to the point P(−2, 4) is $2\sqrt{5}$.

Cumulative Review Page 134 Question 10



First determine r. Substitute $x = 15$ and $y = 8$ into $r^2 = x^2 + y^2$.

$r^2 = (15)^2 + (8)^2$

$r^2 = 225 + 64$

$r = \sqrt{289}$

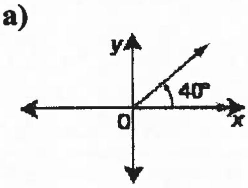
$r = 17$

$\sin\theta = \frac{y}{r}$ $\cos\theta = \frac{x}{r}$ $\tan\theta = \frac{y}{x}$

$\sin\theta = \frac{8}{17}$ $\cos\theta = \frac{15}{17}$ $\tan\theta = \frac{8}{15}$

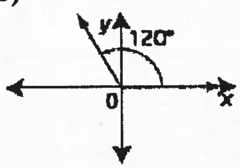
Cumulative Review Page 134 Question 11

a)



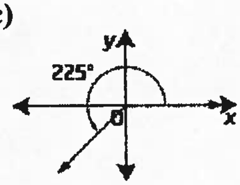
Since 40° is in quadrant I, the reference angle is 40°.

b)



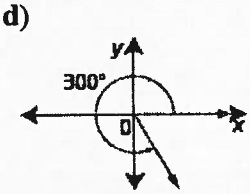
120° is in quadrant II.
Its reference angle is 180° − 120° = 60°.

c)



225° is in quadrant III.
Its reference angle is 225° − 180° = 45°.

d)

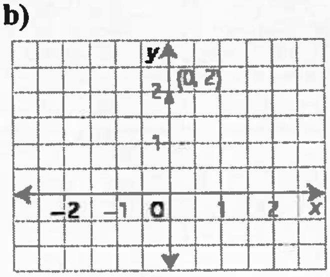


300° is in quadrant IV.
Its reference angle is 360° − 300° = 60°.

Cumulative Review Page 134 Question 12

a) At 3 o'clock the hands form an angle of 90°.

b)



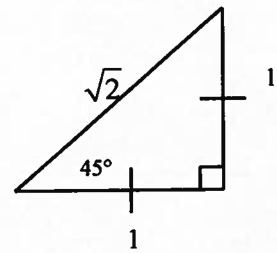
c) $\sin\theta = \frac{y}{r}$ $\cos\theta = \frac{x}{r}$ $\tan\theta = \frac{y}{x}$

$\sin\theta = \frac{2}{2} = 1$ $\cos\theta = \frac{0}{2} = 0$ $\tan\theta = \frac{2}{0}$, which is undefined

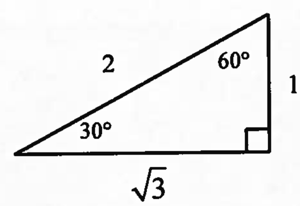
Cumulative Review Page 135 Question 13

a) sin 405° = sin 45°, since 405° is coterminal with 45°. Use the special triangle for 45°.

$$\sin 45° = \frac{1}{\sqrt{2}} \text{ or } \frac{\sqrt{2}}{2}$$



b) The reference angle for 330° is 30° and the angle is in quadrant IV. Use the special triangle for 30° and 60°.



$$\cos\theta = \frac{x}{r}$$

$$\cos 330° = \frac{\sqrt{3}}{2}$$

c) The reference angle for 225° is 45° and the angle is in quadrant III. Use the special triangle shown is part a).

$$\tan\theta = \frac{y}{x}$$

$$\tan 225° = \frac{-1}{-1} = 1$$

d) The point (−1, 0) is on the terminal arm of 180°.

$$\cos\theta = \frac{x}{r}$$

$$\cos 180° = \frac{-1}{1} = -1$$

e) The reference angle for 150° is 30° and the angle is in quadrant II. Use the special triangle for 30° and 60° as shown in part b).

$$\tan\theta = \frac{y}{x}$$

$$\tan 150° = \frac{1}{-\sqrt{3}} \text{ or } -\frac{\sqrt{3}}{3}$$

f) The point (0, −1) is on the terminal arm of 270°.

$$\sin\theta = \frac{y}{r}$$

$$\sin 270° = \frac{-1}{1} = -1$$

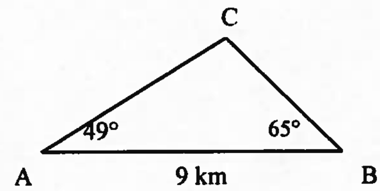
Cumulative Review Page 135 Question 14

First use angle sum of a triangle to determine ∠C.

$\angle C = 180° - (49° + 65°)$

$\angle C = 66°$

Use the sine law to determine each distance, AC and BC.



$$\frac{BC}{\sin 49°} = \frac{9}{\sin 66°} \qquad \frac{AC}{\sin 65°} = \frac{9}{\sin 66°}$$

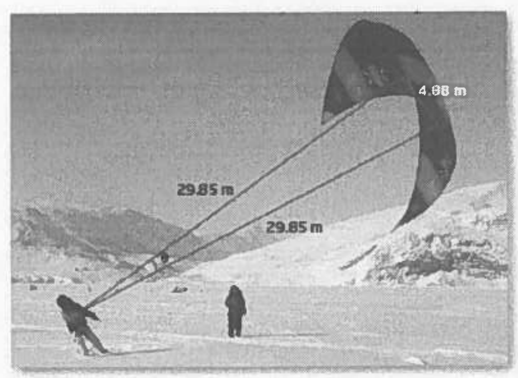
$$BC = \frac{9 \sin 49°}{\sin 66°} \qquad AC = \frac{9 \sin 65°}{\sin 66°}$$

$$BC = 7.435... \qquad AC = 8.928...$$

The polar bear is 8.9 km from station A and 7.4 km from station B, both to the nearenst tenth of a kilometre.

Cumulative Review Page 135 Question 15

Use the cosine law.



$4.88^2 = 29.85^2 + 29.85^2 - 2(29.85)(29.85) \cos \theta$

$1782.045 \cos \theta = 1758.2306$

$$\cos\theta = \frac{1758.2306}{1782.045}$$

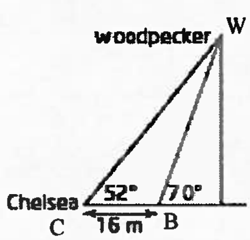
$$\angle\theta = \cos^{-1}\left(\frac{1758.2306}{1782.045}\right)$$

$$\angle\theta = 9.377...$$

The measure of angle θ is 9.4°, to the nearest tenth of a degree.

Cumulative Review Page 135 Question 16

a)



b) In ΔBCW:

$\angle WBC = 180° - 70° = 110°$

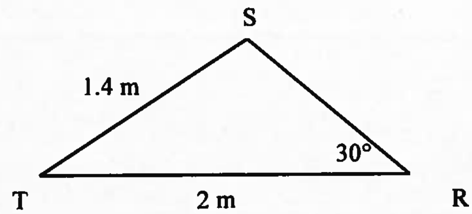
$\angle BWC = 70° - 52° = 18°$

Chelsea is closest to the bird when she is at B.

$$\frac{\text{BW}}{\sin 52°} = \frac{16}{\sin 18°}$$
$$\text{CW} = \frac{16 \sin 52°}{\sin 18°}$$
$$\text{CW} = 40.800...$$
Chelsea is 40.8 m from the bird, to the nearest tenth of a metre.

Cumulative Review Page 135 Question 17

Use the sine law to determine the acute measure of ∠S.



$$\frac{\sin \text{S}}{2} = \frac{\sin 30°}{1.4}$$
$$\sin \text{S} = \frac{2(0.5)}{1.4}$$
$$\angle \text{S} = \sin^{-1}\left(\frac{1}{1.4}\right)$$
$$\angle \text{S} = 45.584...$$
So, obtuse ∠S = 180° − 45.6° = 134.4°, to the nearest tenth of a degree.

Unit 1 Test

Unit 1 Test Page 136 Question 1

The sequence 8, 4, 0…. is arithmetic with $t_1 = 8$ and $d = -4$.
Substitute in $t_n = t_1 + (n - 1)d$
$t_n = 8 + (n - 1)(-4)$
$t_n = 8 - 4(n - 1)$
Therefore, option **B** is best.

Unit 1 Test Page 136 Question 2

Observe the pattern in the terms: $t_1 = x$, $t_2 = x^3$, $t_3 = x^5$, …Then, $t_n = x^{2n-1}$.
So $t^{14} = x^{27}$.
Option **C** is best.

Unit 1 Test Page 136 Question 3

The series 6 + 18 + 54 + … is geometric, with $t_1 = 6$ and $r = 3$. Substitute $S_n = 2184$ into

$$S_n = \frac{t_1(r^n - 1)}{r - 1}.$$