1. A "slackrope walker" is much like a tightrope walker except that the rope on which he performs is not pulled tight. Paul, a slackrope walker, has a rope tied to two 15 m high poles which are 14 m apart. When he is standing on the rope 5 m away from one of the poles, he is 3 m above the ground. How long is the rope?
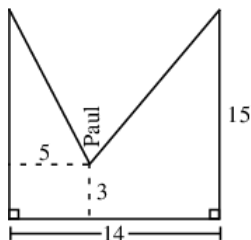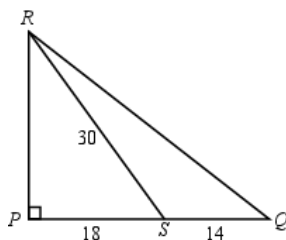

    (A) 28 m   (B) 30 m   (C) 27 m   (D) 26 m   (E) 29 m

2. In the diagram, the horizontal distance between adjacent dots in the same row is 1. Also, the vertical distance between adjacent dots in the same column is 1. What is the perimeter of quadrilateral $PQRS$?
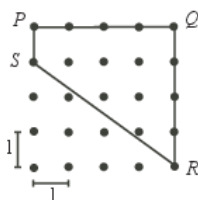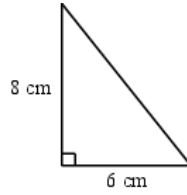

    (A) 12   (B) 13   (C) 14   (D) 15   (E) 16

3. In $\triangle PQR$, $\angle RPQ = 90°$ and S is on PQ. If $SQ = 14$, $SP = 18$, and $SR = 30$, then the area of $\triangle QRS$ is
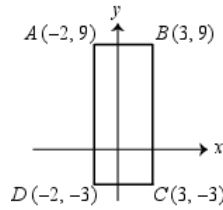

    (A) 84   (B) 168   (C) 210   (D) 336   (E) 384

4. There is a square whose perimeter is the same as the perimeter of the triangle shown. The area of that square is

8 cm

6 cm

(A) 12.25 cm²   (B) 196 cm²   (C) 49 cm²   (D) 36 cm²   (E) 144 cm²

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5. In the diagram, what is the length of BD?

$A(-2, 9)$ y $B(3, 9)$

$\rightarrow x$

$D(-2, -3)$ $C(3, -3)$
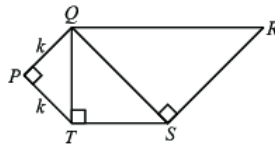
(A) 13   (B) 17   (C) $\sqrt{205}$ (D) $\sqrt{160}$ (E) 15

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6. A line segment joins the points $P(-4, 1)$ and $Q(1, -11)$. What is the length of PQ?
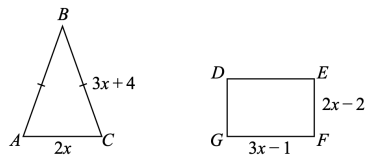   (A) 13   (B) 12   (C) 12.5   (D) 13.6   (E) 12.6

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7. In the diagram, each of $\triangle QPT$, $\triangle QTS$ and $\triangle QSR$ is an isosceles, right-angled triangle, with $\angle QPT = \angle QTS = \angle QSR = 90°$. The combined area of the three triangles is 56. If $QP = PT = k$, what is the value of k?

Q R

k

P

k

T S

(A) $\sqrt{2}$ (B) 1   (C) 4   (D) 2   (E) $2\sqrt{2}$

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8. In the diagram, $\triangle ABC$ has $AB = BC = 3x + 4$ and $AC = 2x$ and rectangle $DEFG$ has $EF = 2x - 2$ and $FG = 3x - 1$.

B

$3x + 4$

A $2x$ C

D E

$2x - 2$

G $3x - 1$ F
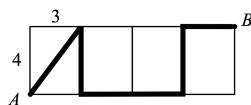
The perimeter of $\triangle ABC$ is equal to the perimeter of rectangle $DEFG$. What is the area of $\triangle ABC$?
   (A) 84   (B) 87.5   (C) 168   (D) 175   (E) 336

9. Equilateral triangle ABC has sides of length 4. The midpoint of BC is D, and the midpoint of AD is E. The value of EC^2 is

(A) 7　　　　(B) 6　　　　(C) 6.25　　　　(D) 8　　　　(E) 10

10. The diagram is made up of four congruent rectangles with dimensions 3 by 4.

The four rectangles are arranged side-by-side forming one larger rectangle. The left side of the large rectangle is labeled 4. The top (and bottom) is the total of four sides of length 3. A is the bottom left vertex of the large rectangle and B is the top right corner. A path is made up of line segments. It starts at A, moves diagonally up across the first rectangle, down the side shared by rectangles 1 and 2, across the bottoms of rectangles 2 and 3, up the shared side of rectangles 3 and 4, and the across the top of rectangle 4, ending at B.

What is the length of the path from A to B shown on the diagram?

(A) 22　　　　(B) 21　　　　(C) 19　　　　(D) 20　　　　(E) 23

11. In the diagram, a circle is inscribed in a large square and a smaller square is inscribed in the circle. If the area of the large square is 36, the area of the smaller square is
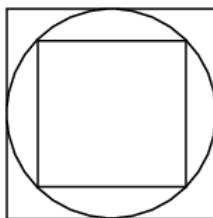

(A) 15　　　　(B) 12　　　　(C) 9　　　　(D) 24　　　　(E) 18

12. In the diagram, right-angled triangles AED and BFC are constructed inside rectangle $ABCD$ so that F lies on DE. If $AE = 21$, $ED = 72$ and $BF = 45$, what is the length of AB?
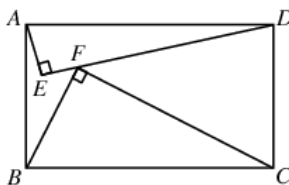

(A) 50　　　　(B) 48　　　　(C) 52　　　　(D) 54　　　　(E) 56

13. Asafa ran at a speed of 21 km/h from P to Q to R to S, as shown. Florence ran at a constant speed from P directly to R and then to S. They left P at the same time and arrived at S at the same time. How many minutes after Florence did Asafa arrive at point R?
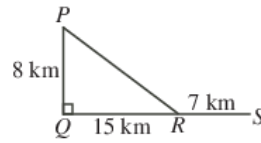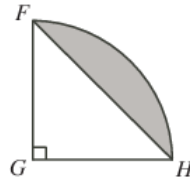

(A) 0   (B) 8   (C) 6   (D) 7   (E) 5

14. The trapezoid shown has a height of length 12 cm, a base of length 16 cm, and an area of 162 cm^2. The perimeter of the trapezoid is
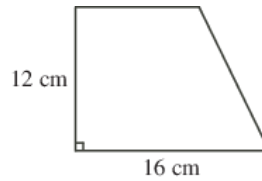

(A) 51 cm   (B) 52 cm   (C) $49.\overline{6}$ cm   (D) 50 cm   (E) 56 cm

15. In right-angled, isosceles triangle FGH, $FH = \sqrt{8}$. Arc FH is part of the circumference of a circle with centre G and radius GH, as shown. The area of the shaded region is


(A) $\pi - 2$ (B) $4\pi - 2$ (C) $4\pi - \frac{1}{2}\sqrt{8}$ (D) $4\pi - 4$ (E) $\pi - \sqrt{8}$

16. Square $PQRS$ has side length 30, as shown. The square is divided into 5 regions of equal area: $\triangle SPT$, $\triangle STU$, $\triangle SVW$, $\triangle SWR$, and quadrilateral $SUQV$. The value of $\dfrac{SU}{ST}$ is closest to
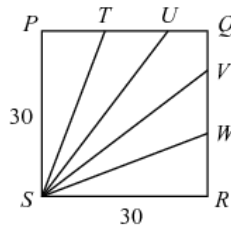

(A) 1.17   (B) 1.19   (C) 1.21   (D) 1.23   (E) 1.25

17. In the diagram, $UVWX$ is a rectangle that lies flat on a horizontal floor. A vertical semi-circular wall with diameter XW is constructed. Point Z is the highest point on this wall. If $UV = 20$ and $VW = 30$, the perimeter of $\triangle UVZ$ is closest to
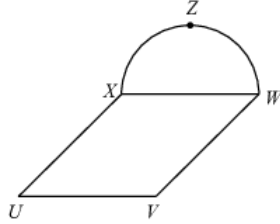

(A) 95   (B) 86   (C) 102   (D) 83   (E) 92

18. In the diagram, O is the centre of a circle with radius 87, and P and M lie on the circle. N is positioned inside the circle so that PN passes through O and is perpendicular to MN.
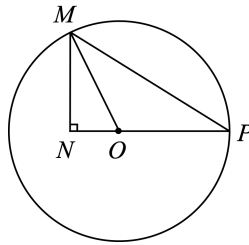
If $MN = 63$, what is the area of $\triangle PMN$?

(A) 3370.5   (B) 3496.5   (C) 4725.0   (D) 4630.5   (E) 4126.5

19. In the diagram, the circle is *inscribed* in the square. This means that the circle and the square share points S, T, U, and V, and the width of the square is exactly equal to the diameter of the circle. Rounded to the nearest tenth, what percentage of line segment XY is outside the circle?
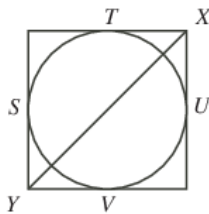
(A) 29.3   (B) 28.3   (C) 33.3   (D) 25   (E) 16.7

20. Points $A(-3, 5)$, $B(0, 7)$ and $C(r, t)$ lie along a line. If $BC = 4AB$ and $r > 0$, what is the value of $r + t$?