

This print-out should have 9 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

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### Holt SF 03Rev 26

**001** (part 1 of 2) 10.0 points

A submarine dives 191.0 m at an angle of  $14.0^\circ$  below the horizontal.

What is the horizontal component of the submarine's displacement?

Correct answer: 185.326 m.

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**002** (part 2 of 2) 10.0 points

What is the vertical component of the submarine's displacement?

Correct answer:  $-46.2071$  m.

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### Magnitude of a Vector

**003** (part 1 of 2) 10.0 points

Vector  $\vec{B}$  has  $x$ ,  $y$ , and  $z$  components of 5.8, 2.1, and 3.4 units, respectively.

Calculate the magnitude of  $\vec{B}$ .

Correct answer: 7.04344.

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**004** (part 2 of 2) 10.0 points

What is the angle between  $\vec{B}$  and the  $x$ -axis?

Correct answer:  $34.5672^\circ$ .

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### Vector Addition 02

**005** (part 1 of 2) 10.0 points

Two vectors  $\mathbf{A}$  and  $\mathbf{B}$  lie in the  $xy$  plane and are given by

$$\begin{aligned}\mathbf{A} &= A_x \mathbf{i} + A_y \mathbf{j} \\ \mathbf{B} &= B_x \mathbf{i} + B_y \mathbf{j}.\end{aligned}$$

where  $A_x = 9.36$  m,  $A_y = 1.22$  m,  $B_x = 9.63$  m,  $B_y = -4.5$  m.

Find the magnitude of  $\mathbf{R} = \mathbf{A} + \mathbf{B}$ .

Correct answer: 19.2712 m.

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**006** (part 2 of 2) 10.0 points

Find the angle  $\theta$  (between  $-180^\circ$  and  $+180^\circ$

with counterclockwise positive) that the vector  $\mathbf{R}$  makes from the positive  $x$  axis.

Correct answer:  $-9.79959^\circ$ .

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### Sum of Three Vectors 01

**007** (part 1 of 2) 10.0 points

Consider three force vectors  $\vec{F}_1$ ,  $\vec{F}_2$ , and  $\vec{F}_3$  with magnitude  $F_1 = 94$  N and direction  $\theta_1 = 243^\circ$ ; magnitude  $F_2 = 82$  N and direction  $\theta_2 = 354^\circ$ ; and magnitude  $F_3 = 59$  N and direction  $\theta_3 = 138^\circ$ . All direction angles  $\theta$  are measured from the positive  $x$  axis: counterclockwise for  $\theta > 0$  and clockwise for  $\theta < 0$ .

What is the magnitude of the resultant vector  $\|\vec{F}\|$ , where  $\vec{F} = \vec{F}_1 + \vec{F}_2 + \vec{F}_3$ ?

Correct answer: 53.0804 N.

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**008** (part 2 of 2) 10.0 points

What is the direction of this resultant vector  $\vec{F}$ ? Use counterclockwise as the positive angular direction, between the limits of  $-180^\circ$  and  $+180^\circ$  from the positive  $x$  axis.

Correct answer:  $-95.3724^\circ$ .

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### Angle Between Vectors

**009** 10.0 points

Vector  $\vec{A}$  has components

$$A_x = -4.4, \quad A_y = 6.7, \quad A_z = 1.1,$$

while vector  $\vec{B}$  has components

$$B_x = 6.6, \quad B_y = -2.4, \quad B_z = 2.9.$$

What is the angle  $\theta_{AB}$  between these vectors? (Answer between  $0^\circ$  and  $180^\circ$ .)

Correct answer: 133.006°.