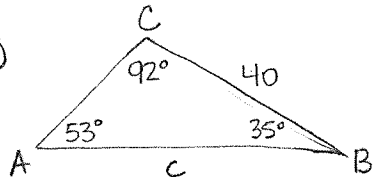
Precalculus - Semester 2 Review Key

① $2\sin^2 x - 2\sin^4 x$
$= 2\sin^2 x(1-\sin^2 x)$ C
$= 2\sin^2 x \cdot \cos^2 x$

② $2\sin(x+\theta) - \sin(x-\theta)$
$= 2(\sin x\cos\theta + \cos x\sin\theta) - (\sin x\cos\theta - \cos x\sin\theta)$
$= 2\sin x\cos\theta + 2\cos x\sin\theta - \sin x\cos\theta + \cos x\sin\theta$
$= 3\cos x\sin\theta + \sin x\cos\theta$ A

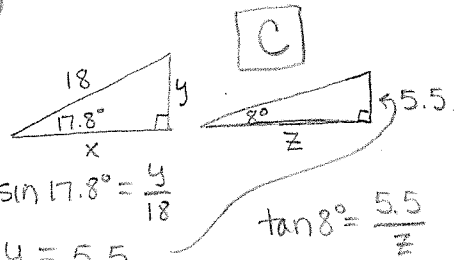
③ $\cos x - 1 = 0$
$\cos x = 1$ C
$x = 0$

④ $6\sin^2 x + 5\sin x - 4 = 0$
$(2\sin x - 1)(3\sin x + 4) = 0$ B
$\sin x = 1/2 \quad \sin x = -4/3$
$x = \frac{\pi}{6}, \frac{5\pi}{6} \quad \emptyset$ (larger than 1)

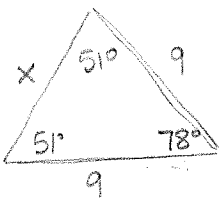
⑤


$\frac{40}{\sin 53°} = \frac{c}{\sin 92°}$ B
$c = 50.1$

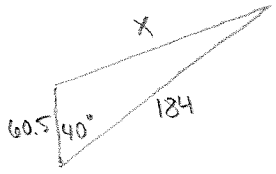
⑥ $A = \frac{1}{2}bc\sin A$
$A = \frac{1}{2}(5)(2)\sin 89°$
$A = 5$ A

⑦


C
$\sin 17.8° = \frac{y}{18}$
$y = 5.5\ldots$
$\cos 17.8 = \frac{x}{18}$
$x = 17.138\ldots$
$\tan 8° = \frac{5.5}{z}$
$z = 39.15\ldots$
$z - x = 22.014$

⑧


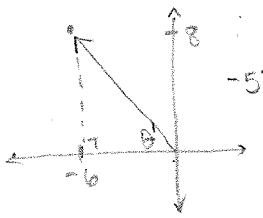
$x^2 = 9^2 + 9^2 - 2(9)(9)\cos 78°$
$x = 11.3$ A

⑨


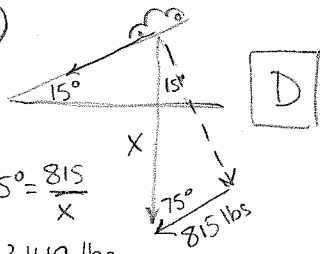
$x^2 = 60.5^2 + 184^2 - 2(60.5)(184)\cos 40°$
$x = 143$ ft. D

⑩ $\vec{u} = \langle 9 - -4, 4 - 7\rangle$
$\vec{u} = \langle 13, -3\rangle$
$\|\vec{u}\| = \sqrt{13^2 + (-3)^2} = \sqrt{178}$
$\|\vec{u}\| \approx 13.34$ D

⑪ $4\vec{u} = \langle -12, -28\rangle$; $2\vec{v} = \langle 8, -4\rangle$
$4\vec{u} + 2\vec{v} = \langle -4, -32\rangle$ C

⑫


$-53.13 + 180 = 126.87°$ D
$\tan\theta' = \frac{8}{-6}$
$\theta' = -53.13°$

⑬


D
$\sin 15° = \frac{815}{x}$
$x = 3149$ lbs

⑭ a) $\vec{u}\cdot\vec{v} = (-2)(-3) + (-5)(-4) = 26$
$26\langle 2, 1\rangle = \langle 52, 26\rangle$
b) $-4\vec{u} = \langle 8, 20\rangle$ D
$-4\vec{u}\cdot\vec{v} = (8)(-3) + (20)(-4) = -104$

⑮ $\vec{PQ} = \langle -2-2, -5-1\rangle$
$\vec{PQ} = \langle -4, -6\rangle$ C
$\vec{F} = \langle -5, -2\rangle$
Work $= \vec{F}\cdot\vec{PQ} = 20 + 12$
$= 32$

⑯ $\vec{F} = \langle 110, 0\rangle$ C
$\vec{PQ} = \langle 10\cos 50°, 10\sin 50°\rangle$
Work $= \vec{F}\cdot\vec{PQ}$
$= 110(10\cos 50) + 0(10\sin 50)$
$= 707$ ft. lbs

⑰ x = saltwater fish y = freshwater fish
$4x + y = 47$
$x + y = 17$ D
$3x = 30$
$x = 10$
$y = 7$

⑱ $2x - 5y = 1$
$3x + 5y = -11$ $y = -1$ C
$5x = -10$ $(-2, -1)$
$x = -2$

(19) ① $x+5y+6z=50$
② $9x+y-4z=28$
③ $4x-2y-7z=-21$

$-9\times$① $-9x-45y-54z=-450$
② $9x+y-4z=28$
$-44y-58z=-422$

$-4\times$① $-4x-20y-24z=-200$
③ $4x-2y-7z=-21$
$-22y-31z=-221$

$-44y-58z=-422 \rightarrow -44y-58z=-422$
$-2(-22y-31z=-221) \rightarrow 44y+62z=442$
$4z=20$
$z=5$

$y=3$
$x=5$
$(5,3,5)$
C

(20) A

(21) $\begin{bmatrix}0&-3&1\\2&-1&0\end{bmatrix}\begin{bmatrix}1&-2\\0&1\\-2&-1\end{bmatrix}=\begin{bmatrix}-2&-4\\2&-5\end{bmatrix}$ A
2×3 3×2 2×2

(22) Use matrix calculator C

(23) $\begin{bmatrix}-1&1\\4&-5\end{bmatrix}$ B
$5-4=1$

(24) $+\begin{vmatrix}1&-2&-4\\-3&4&5\\5&2&3\end{vmatrix}=1(2)+3(2)+5(6)=38$ A

(25) $D=\begin{vmatrix}2&-1&-3\\2&1&-3\\2&-1&3\end{vmatrix}=24$ $D_x=\begin{vmatrix}-4&-1&-3\\-2&1&-3\\-10&-1&3\end{vmatrix}=-72$

$D_y=\begin{vmatrix}2&-4&-3\\2&-2&-3\\2&-10&3\end{vmatrix}=24$ $D_z=\begin{vmatrix}2&-1&-4\\2&1&-2\\2&-1&-10\end{vmatrix}=-24$

$x=\frac{-72}{24}=-3$ $y=\frac{24}{24}=1$ $z=\frac{-24}{24}=-1$
$(-3,1,1)$ B

(26) B

(27) $\frac{10!}{4!}=151{,}200$ A

(28) $\sum_{n=1}^{42}(5n-6)=\overbrace{-1+\ldots+204}^{203}=(203)\left(\frac{42}{2}\right)=4263$ A

(29) $\sum_{n=2}^{6}\left(-2\left(\tfrac12\right)^n\right)=-\frac12\left(\frac{1-(1/2)^5}{1-1/2}\right)=\frac{-31}{32}\approx-.969$ C

(30) $\sum_{n=1}^{\infty}-4\left(\tfrac34\right)^{n-1}=\frac{-4}{1-3/4}=-16$ B

(31) $(2a-b)^4=1(2a)^4+4(2a)^3(-b)^1+6(2a)^2(-b)^2+4(2a)(-b)^3+1(-b)^4$
$=16a^4-32a^3b+24a^2b^2-8ab^3+b^4$ A

(32) $16x^2-121y^2-49=0$
Hyperbola A & C have different signs D

(33) $y^2=-16x$
$4p=-16$
$p=-4$
vertex: $(0,0)$
opens left
focus: $(-4,0)$
directrix: $x=4$
A

(34) $x^2+16y^2=16$
$\frac{x^2}{16}+\frac{y^2}{1}=1$ A

(35) $16x^2+25y^2+32x+200y+16=0$
$16(x^2+2x+1)+25(y^2+8y+16)=-16+16+400$
$\frac{(x+1)^2}{25}+\frac{(y+4)^2}{16}=1$
$a=5$ $b=4$ $4^2+c^2=5^2$ $c=3$
eccentricity: $\frac{c}{a}=\frac35$
C

(36) $256x^2-36y^2=64$
$\frac{x^2}{1/4}-\frac{y^2}{16/9}=1$
$a=1/2$ $b=4/3$ $c=\frac{\sqrt{73}}{6}$
center: $(0,0)$
vertices: $(1/2,0)(-1/2,0)$
foci: $\left(\frac{\sqrt{73}}{6},0\right)\left(-\frac{\sqrt{73}}{6},0\right)$
A

(37) $x=t^3 \rightarrow \sqrt[3]{x}=t$
$y=1/4t$ $y=\frac14\sqrt[3]{x}$
C

(38) B

1. C
2. A
3. C
4. B
5. B
6. A
7. C
8. A
9. D
10. D
11. C
12. D
13. D
14. D
15. C
16. C
17. D
18. C
19. C
20. A
21. A
22. C
23. B
24. A
25. B
26. B
27. A
28. A
29. C
30. B
31. A
32. D
33. A
34. A
35. C
36. A
37. C
38. B