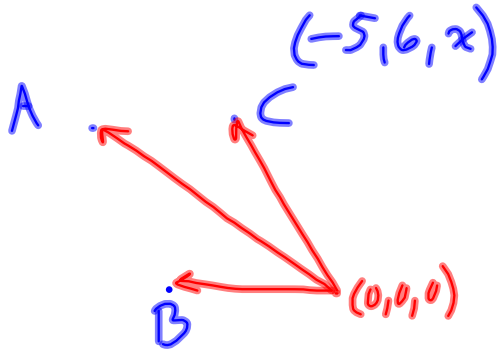
REVIEW

p.344-347

#1, 2a, 3, 5, 6a, 7, 8,
11, 12b, 15ab,
16c(also find direction)
19a, 21, 23

p.341 #14

$(0,0,0)$



$\vec{OC} = (-5,6,x)$

$a\vec{OA} + b\vec{OB} = \vec{OC}$

$a(-1,3,4) + b(-2,3,-1) = (-5,6,x)$

① $-a-2b = -5$

①×3 $-3a-6b = -15$

② $3a+3b = 6$

③ $4a-b = x$

①×3+② ⇒ $-3b = -9$

$b = 3$

From ① $a = -1$

Use a & b to solve for x:

③ $4(-1)-(3) = x$

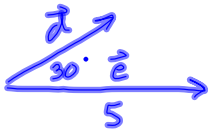
$-4-3 = x$

$x = -7$

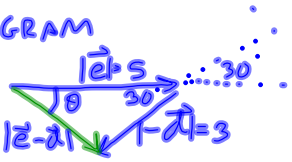
∴ If x was -7, then the origin would be coplanar with A, B & C.

#16c p.346 $|\vec{e}-\vec{a}|$ $|\vec{e}|=5$ $|\vec{a}|=3$ 30°

POSITION DIAGRAM



VECTOR DIAGRAM



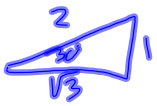
Assuming $\vec{e}$ is pointed along the +ve x-axis

$$|\vec{e}-\vec{a}| = \left(|\vec{e}|^2+|\vec{a}|^2-2|\vec{e}||\vec{a}|\cos 30^\circ\right)^{1/2}$$

$$\doteq 2.83$$

To find direction use Sine Law in Vector diagram:

$$\frac{\sin\theta}{|-\vec{a}|} = \frac{\sin 30}{|\vec{e}-\vec{a}|}$$



$$\sin\theta \doteq \frac{1}{2(2.83)} \cdot 3$$

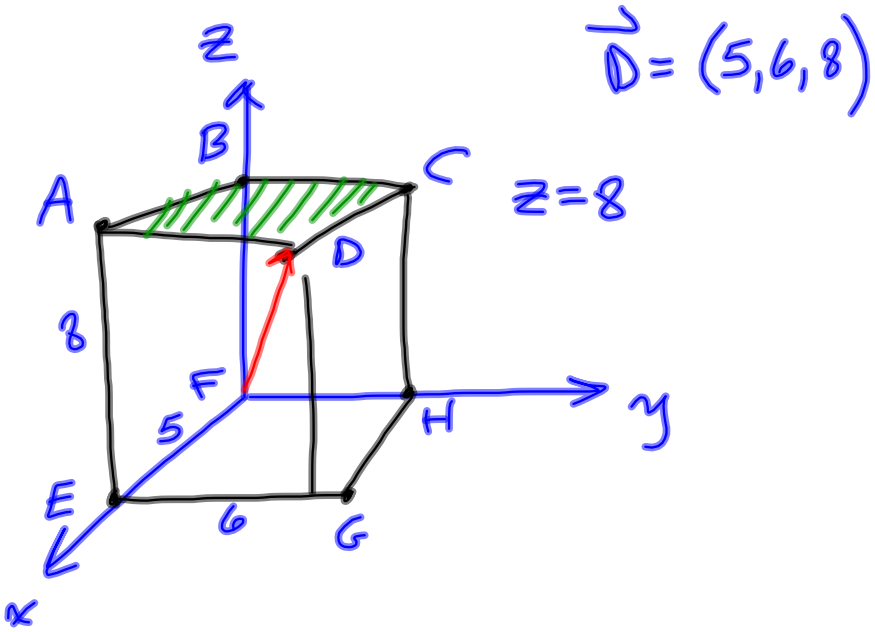
$$\theta \doteq \sin^{-1}(\ \downarrow\ )$$

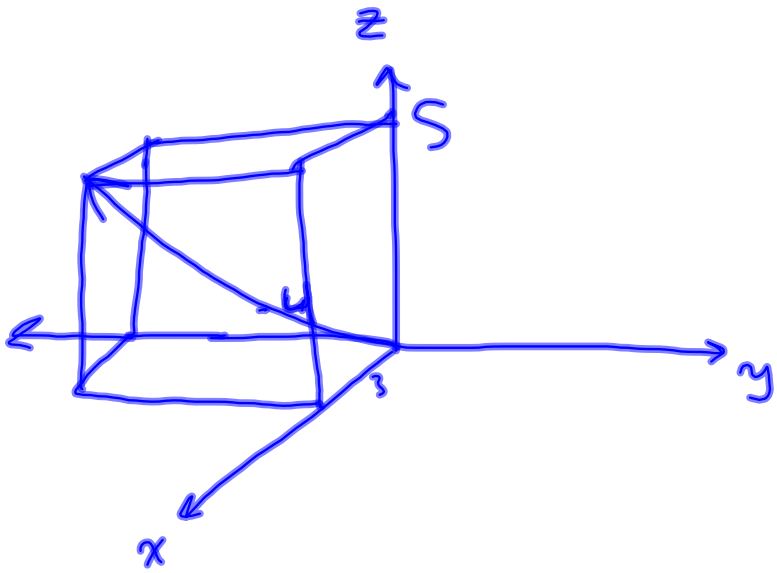
$$\doteq 32^\circ$$

∴ The magnitude of $\vec{e}-\vec{a}$ is 2.83 and the direction 38.65° clockwise from the +ve x-axis

$(E\ 38.65^\circ S)$

16a)


z
B
A
C
D
8
F
5
H
y
E
6
G
x
$\vec{D} = (5,6,8)$
z=8



$\vec{D} = (3, -4, 5)$

19 a. $\vec{a}=(5,9,14)$ $\vec{b}=(-2,3,1)$ $\vec{c}=(3,1,4)$

Let j & k rep. coefficients that multiply vectors $\vec{b}$ & $\vec{c}$ to be a linear combination equal to vector $\vec{a}$.

$(5,9,14)=j(-2,3,1)+k(3,1,4)$

Equations:

x-Component: ① $5=-2j+3k$

y-Components: ② $9=3j+k$

z-Component: ③ $14=j+4k$

1.] Multiply ③ x 2:

$28=2j+8k$

2.] Add ① + ③:

$5=-2j+3k$

$28=2j+8k$

$33=11k$

$k=3$

sub $k=3$ into ① or ③ (not ②):

③ $\Rightarrow$ $14=j+4(3)$

$j=2$

Check that j & k are valid in ②:

LS	RS
9	$3j+k$
	$=3(2)+3$
	$=9$

$\therefore$ LS = RS

$\therefore$

$$\left[\begin{array}{ccc|c} 4 & 6 & 7 & 8 \\ 5 & 2 & 9 & 1 \\ 7 & 4 & 6 & 3 \\ 14 & 2 & 1 & 0 \end{array}\right]$$

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & * \\ 0 & 1 & 0 & * \\ 0 & 0 & 1 & * \\ 0 & & & 1 \end{array}\right]$$

$x=2 \quad y=4 \quad z=-3$

① $x+y+z=3$

② $2x+y+z=5$

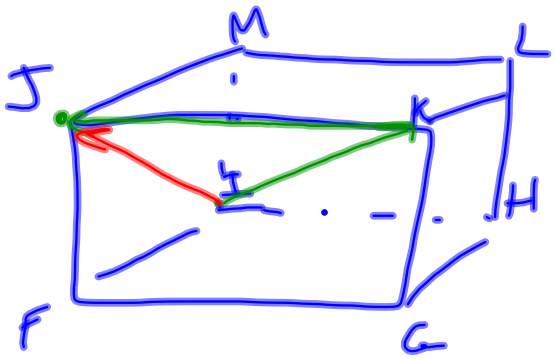
③ $3x+y+z=7$

$x=(3-y-z)$

Sub into ②

$2(3-y-z)+z=5$

23d)



Forces as Vectors

A Force is a vector {Mag & Direction}

Moving / Pushing / Pull

↓

not always