Welcome Back MYP Math 9!

	Assignment Effort Grade (Circle One)	Comments (What was interesting or challenging?)
Monday Date: 10/16 Topic: Vector Quiz	0 1 2	
Tuesday Date: ______ Topic: ____________	0 1 2	
Wednesday Date: ______ Topic: ____________	0 1 2	
Thursday Date: ______ Topic: ____________	0 1 2	
Friday Date: ______ Topic: ____________	0 1 2	

Class Plan:

1. Mathematician Monday
2. Warm-up

F VECTOR SUBTRACTION

3. Vector Subtraction (26E)

-Video Break

4. Practice!

Mathematician Monday!

Dr. Minerva Cordero
Professor University of Texas, Arlington

Welcome to the Home Page of Dr. Minerva Cordero

Associate Dean for Academic Affairs
Professor of Mathematics
Distinguished University Teaching Professor

The University of Texas
ARLINGTON

Department of Mathematics
College of Science
P. O. Box 19047
Arlington, Texas 76019-0047
Voice: (817)272-9691
FAX: (817)272-3511
Email: cordero@uta.edu

- Research/Vita
- Teaching
- GK-12 Program
- Links to biograpies and others
- NormFest 2009

Dr. Minerva Cordero

Bayamon, Puerto Rico (Northern Puerto Rico)

Academic Experience

9/2013-present — Professor, Department of Mathematics
The University of Texas at Arlington

9/2001-8/2013 — Associate Professor, Department of Mathematics
The University of Texas at Arlington

8/1990-8/2001 — Associate and Assistant Professor,
Department of Mathematics and Statistics, Texas Tech University

Education

Ph.D.	Mathematics	The University of Iowa	1989
M.A.	Mathematics	The University of California at Berkeley	1983
B.S.	Mathematics	The University of Puerto Rico	1981

Dr. Minerva Cordero Awards:

Honors and Awards

Ford 2016 Legendary Women (Mujeres Legendarias de Ford 2016), October 2016
Great Minds in STEM 2016 HENAAC Award "Education Distinction, October 2016
Honors College Distinguished Faculty Award, University of Texas at Arlington, April 2012
Certificate of Meritorious Service, Mathematical Association of America, January 2012
Featured Biography, *SACNAS Biography Project*, May 2011, http://www.uta.edu/math/gk12/news/index.html
University of Texas Regents' Outstanding Teaching Award, University of Texas System, August 2009
Professor of the Year Award, Mathematical Association of America Student Chapter at UT Arlington, April 2009
Faculty Development Leave, The University of Texas at Arlington, Fall 2007

Dr. Minerva Cordero Awards:

Award for Distinguished College or University Teaching, Texas Section of the Mathematical Association of America, April 2007.

Research Excellence Travel Award, The University of Texas at Arlington, Spring 2007.

Research Excellence Travel Award, The University of Texas at Arlington, Spring 2006

Academy of Distinguished Teachers, inducted April 2005, The University of Texas at Arlington, Member April 2005-present.

Featured Mathematician, Scott Foresman-Addison Wesley, ***Grade 1 Mathematics Textbook***, Cultural Connections, page 204 B, 2005.

Outstanding Student Organization Advisor Award, The University of Texas at Arlington, April 2005.

Faculty Development Leave, Texas Tech University, Spring 2002

Honoree, *Outstanding Hispanic Women of the South Plains*, South Plains Hispanic Chamber of Commerce, September 2000.

Featured Biography, Mathematical Association of America Strengthening Underrepresented Minority Mathematics Achievement (SUMMA) Program, http://www.maa.org/summa/archive/corder_m.htm

President's Excellence in Teaching Award, Texas Tech University, 1999.

Who's Who Among America's Teachers, 1998, 2000, 2004.

Texas Tech University Teaching Academy for Distinguished Teachers, inducted 1997, Texas Tech University, Member 1997-2001.

Professor of the Year, Mathematical Association of America, Student Chapter at Texas Tech University, 1995.

Nominee from Texas Tech University for the *Presidential Faculty Fellow Award*, National Science Foundation, 1995.

New Faculty Award, Texas Tech University Ex-Students Association, 1994.

Recognition Award for Emerging Scholars, American Association of University Women, Nominee from Texas Tech University, Third place nationally, 1993.

Dr. Minerva Cordero (Biography)

SACNAS
BIOGRAPHY PROJECT

"If someone told you there was a family that had six children and was so poor they could not afford a TV, board games, or even toys, you might consider this tragic. In my family, however, we unknowingly seized our predicament to develop our imaginations!

I was born in a small town in Bayamon, Puerto Rico, to a family of six children. I had an older brother and two older sisters, as well as a younger sister and brother. Six years spanned the oldest to the youngest. My parents were from farming families—a coffee plantation and a dairy farm. For my parents, going to school was a struggle since they were needed to work for their families on the farm. As a result, my father only completed the second grade and my mother the sixth grade.

Dr. Minerva Cordero (Biography)

At my elementary school, everyone received free lunch and free government shoes, including me. In the fourth grade, I had a very stern and serious math teacher named Ms. Hernandez. She would slap you with a ruler if you didn't know your multiplication tables. Ironically, her threats began my appreciation for a type of certainty and precision in mathematics that is unrivaled by other subjects. I appreciated this, even if sometimes I had to learn the hard way!

In seventh grade, I had another very strict but wonderful teacher named Ms. Figueroa. At lunchtime she occasionally invited me to work on puzzles and play math games by throwing dice and finding the sum as a race. This is when I "officially" fell in love with math!

Dr. Minerva Cordero (Biography)

I had a lot of support for school at home, especially from my mother. She always told us that the best gift she could give us was an education, because that is the one thing that no one can ever take away from you. She instilled a love for learning in all of us. Every day we would learn from each other.

After dinner, my three sisters and I would clean up and then sit at the corners of the table spreading out all our books. My sisters and I would share all that we were learning in our classes—it was the most wonderful thing. We would do this every single day, even on the weekends. I remember when my older sister took an art class in college, she told us about all these amazing painters we never knew existed: Monet, Degas, and others. We were fascinated. We just loved learning!

Dr. Minerva Cordero (Biography)

Often my oldest sister, Nilda, would pretend she was a teacher while the other sisters were students who would misbehave. We thought it was hilarious. I admire Nilda a lot, because at age 16, she started college, which was located far from our home. When she would come home, Nilda would tell us all about the subjects she was learning. Nilda got a master's degree in chemistry at the University of Puerto Rico and after all of our make-believe games, really did become a high school chemistry teacher.

Dr. Minerva Cordero (Biography)

I was also very close to my sister Olga, who is just 11 months older than me. In tenth grade, we took algebra together. After doing our homework independently, we would check each other's homework. Our teacher showed us the elegance of mathematics and that is when I fell in love even more with the subject. In eleventh grade I took geometry with my younger sister, and we would work on homework together.

During my senior year there were no math classes I could take, so I bought a book to learn more math on my own. It was a book to prepare for the equivalent of the SAT exam in the U.S. In the afternoon afterschool, I would sit outside my home in the balcony with a little chalkboard and study the book until it was time for dinner.

Dr. Minerva Cordero (Biography)

At the time, I had a boyfriend who was from another school. Dating was very strict—you needed a chaperone to go out, so there wasn't much chance to get distracted. He ended up going far away to college to study engineering. So it was just me, my books, and my chalkboard once again. I studied very hard to prepare for the college entrance examination; it had 5 parts, each worth 800 points. So the maximum score was 4000 and my school had an average of 1950. I scored 3521! With this score, I was able to attend the University of Puerto Rico, in my hometown of Bayamon.

Many of my classmates came from excellent private schools. It was a challenge trying to stay at the top of my class knowing everyone knew so much more than I did. There were so many things I hadn't been exposed to in school before. There was so much more to learn. Still, I wasn't discouraged—just excited!

Dr. Minerva Cordero (Biography)

In the third year, I transferred to the main campus of the University of Puerto Rico in Rio Piedras where I took a class in abstract algebra. It was so different from the concrete math I was used to learning. Also, my professor was American and could not speak Spanish very well, and I couldn't understand her. It was the very first time ever that I was lost in a math class! Still, I wouldn't settle for less than an A. I asked, "Can I do this?" and I thought, "Sure I can!" I studied and studied and earned an A. I felt that I had learned so much in that class. When I graduated with the bachelor's degree in mathematics, I had the highest GPA of the graduating class and received the award for "Student with the highest GPA in Mathematics."

One of my professors suggested I go to the U.S. to get a PhD, since there was no PhD program in mathematics in Puerto Rico at the time. I didn't see how this was possible. Sadly, a few days before my second year of college, my father had died in a tragic accident. He was the breadwinner of the family, and after completing an undergraduate degree it seem that the only thing to do was to get a job to help take care of my family. One of my professors suggested that I go to Berkeley, California, and work as a nanny while going to school. But I was scared because I didn't speak English well enough. Other opportunities presented themselves and I applied for a National Science Foundation Graduate Scholarship for minorities and got it! I chose to go to Berkeley where I got my master's degree in mathematics; luckily, I didn't have to get a supplemental job to be able to afford the tuition.

Dr. Minerva Cordero (Biography)

After that, I went to the University of Iowa for the PhD program since my sister Olga was already there. I passed my three comprehensive PhD exams in algebra, analysis, and topology. And then, the most terrible thing happened—my mother died of breast cancer. I was 27 and it was a very, very hard time for me. I thought, “Why do I want to do this anymore? She is not going to be able to see me.” It took me a long time to recover from this loss. My sisters would just tell me, “You have to keep going! “One day, I finally thought, “Well, wherever my mother is, she is going to see me graduate, and she is going to be very proud of me!” So I continued my studies and received a PhD in mathematics from the University of Iowa. Today, I am an associate professor of mathematics at the University of Texas at Arlington. My research is in finite geometries—which is at the intersection of geometry, algebra and combinatorics.

Dr. Minerva Cordero (Biography)

I am married to a wonderful man, who is also a mathematician, and we have two sons. My life is full and rich, and I am very thankful!

My thoughts or advice for the younger generation is to slow down in your studies and learn the basics very well. Nowadays, students want to do everything fast—REALLY fast, and that is not always the best way.

It is best to start slow by getting a good foundation of the subject because later you can catch up with the rest. You have to believe that you can do it, and know that it is going to take time and work. The key is time. If you take your time and work hard, you are going to succeed!"

Dr. Codero's research

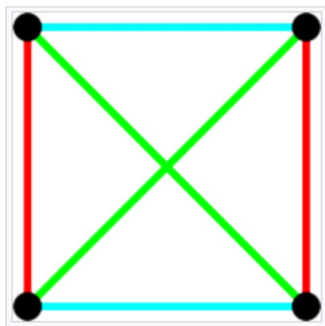
Pure Mathematics: Finite Geometries and Combinatorics

Finite geometry

From Wikipedia, the free encyclopedia

A **finite geometry** is any geometric system that has only a finite number of points. The familiar Euclidean geometry is not finite, because a Euclidean line contains infinitely many points. A geometry based on the graphics displayed on a computer screen, where the pixels are considered to be the points, would be a finite geometry. While there are many systems that could be called finite geometries, attention is mostly paid to the finite projective and affine spaces because of their regularity and simplicity. Other significant types of finite geometry are finite Möbius or inversive planes and Laguerre planes, which are examples of a general type called Benz planes, and their higher-dimensional analogs such as higher finite inversive geometries.

Finite affine plane example



Finite affine plane of order 2, containing 4 "points" and 6 "lines". Lines of the same color are "parallel". The centre of the figure is not a "point" of this affine plane, hence the two green "lines" don't "intersect".

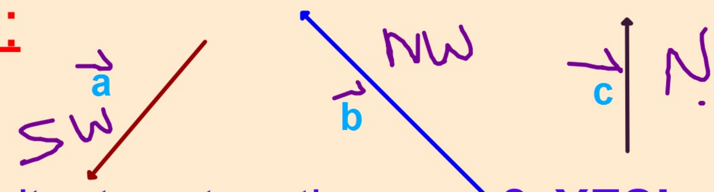
Dr. Codero's research

Pure Mathematics: Finite Geometries and Combinatorics

Finite geometries may be constructed via linear algebra, starting from vector spaces over a finite field; the affine and projective planes so constructed are called Galois geometries. Finite geometries can also be defined purely axiomatically. Most common finite geometries are Galois geometries, since any finite projective space of dimension three or greater is isomorphic to a projective space over a finite field (that is, the projectivization of a vector space over a finite field). However, dimension two has affine and projective planes that are not isomorphic to Galois geometries, namely the non-Desarguesian planes. Similar results hold for other kinds of finite geometries.

Combinatorics is the branch of mathematics studying the enumeration, combination, and permutation of sets of elements and the mathematical relations that characterize their properties. Mathematicians sometimes use the term "**combinatorics**" to refer to a larger subset of discrete mathematics that includes graph theory.

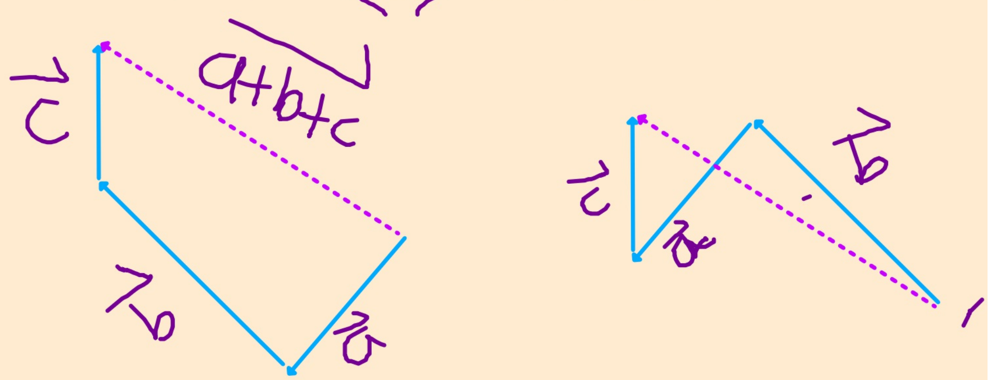
Warm-up:



Are the resultant vectors the same? **YES!**

Sketch the resultant vector.

1. **a** + **b** + **c** 2. **b** + **a** + **c**



E MULTIPLYING VECTORS BY A NUMBER

NEGATIVE VECTORS

Algebraically:

If $\mathbf{a} = \begin{pmatrix} a_1 \\ a_2 \end{pmatrix}$, then $-\mathbf{a} = \begin{pmatrix} -a_1 \\ -a_2 \end{pmatrix}$ is the **negative vector** of $\mathbf{a}$.

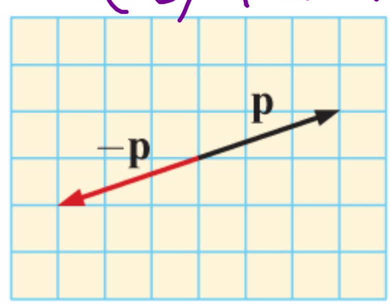
$$\left|\vec{p}\right| = \left|-\vec{p}\right|$$

Length is preserved!

$a = \begin{pmatrix} -2 \\ 3 \end{pmatrix}$ $-a = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$ $|a| = |-a|$

Geometrically:

Direction is the opposite of ***p***.



E MULTIPLYING VECTORS BY A NUMBER

THE ZERO VECTOR

The **zero vector** is the vector $\begin{pmatrix} 0 \\ 0 \end{pmatrix}$

The **zero vector**, **0** has length 0.

It is the only vector with no direction.

For any vector **a**, $\mathbf{a} + (-\mathbf{a}) = (-\mathbf{a}) + \mathbf{a} = \mathbf{0}$.

$\sqrt{0^2+0^2} = 0$

F VECTOR SUBTRACTION

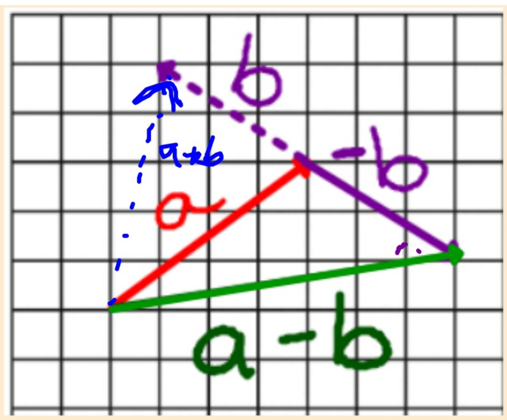
To **subtract** a vector we **add its negative**.

Algebraically:

If $\mathbf{a} = \begin{pmatrix} a_1 \\ a_2 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} b_1 \\ b_2 \end{pmatrix}$ then $\mathbf{a} - \mathbf{b} = \begin{pmatrix} a_1 - b_1 \\ a_2 - b_2 \end{pmatrix}$.

Geometrically:

Start with ***a***, then at the arrow of ***a***, draw the ***-b***



F VECTOR SUBTRACTION

Why add/subtract vectors?
...we'd prefer to have one!

https://www.youtube.com/watch?v=vZ8ubeohg5k

E Practice! MULTIPLYING VECTORS BY A NUMBER

Example 7

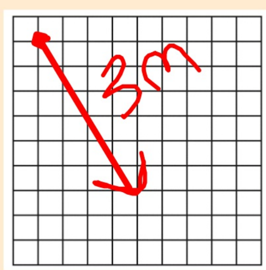
If $\mathbf{m} = \begin{pmatrix} 1 \\ -2 \end{pmatrix}$, find:

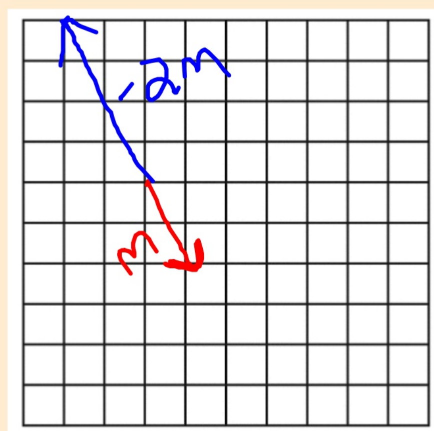
a $3\mathbf{m}$ **b** $-2\mathbf{m}$

Illustrate your answers. (AKA - Show geometrically!)

$-2m = \begin{pmatrix} -2 \\ 4 \end{pmatrix}$

$3m = \begin{pmatrix} 3 \\ -6 \end{pmatrix}$





F Practice- Solutions! VECTOR SUBTRACTION

Example 7

If $\mathbf{m} = \begin{pmatrix} 1 \\ -2 \end{pmatrix}$, find:

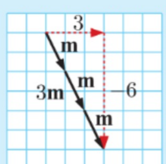
a $3\mathbf{m}$ **b** $-2\mathbf{m}$

Illustrate your answers.

a $3\mathbf{m} = 3\begin{pmatrix} 1 \\ -2 \end{pmatrix}$

$= \begin{pmatrix} 3 \times 1 \\ 3 \times -2 \end{pmatrix}$

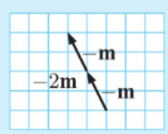
$= \begin{pmatrix} 3 \\ -6 \end{pmatrix}$

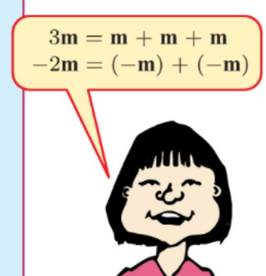


b $-2\mathbf{m} = -2\begin{pmatrix} 1 \\ -2 \end{pmatrix}$

$= \begin{pmatrix} -2 \times 1 \\ -2 \times -2 \end{pmatrix}$

$= \begin{pmatrix} -2 \\ 4 \end{pmatrix}$





F Practice! **VECTOR SUBTRACTION**

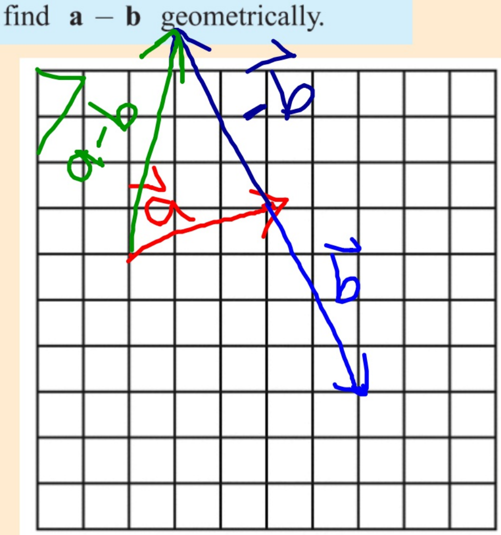
Example 8

If $\mathbf{a} = \begin{pmatrix} 3 \\ 1 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 2 \\ -4 \end{pmatrix}$ find $\mathbf{a} - \mathbf{b}$.

Illustrate how to find $\mathbf{a} - \mathbf{b}$ geometrically.

$\vec{a} - \vec{b} = \begin{pmatrix} 3-2 \\ 1--4 \end{pmatrix}$

$\vec{a} - \vec{b} = \begin{pmatrix} 1 \\ 5 \end{pmatrix}$



F Practice- Solutions! VECTOR SUBTRACTION

Example 8

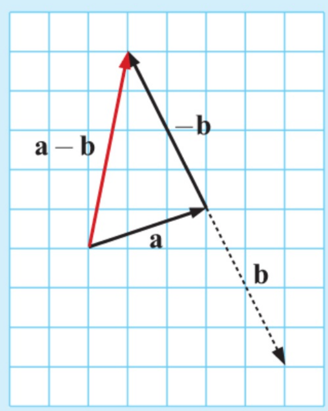
If $\mathbf{a} = \begin{pmatrix} 3 \\ 1 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 2 \\ -4 \end{pmatrix}$ find $\mathbf{a} - \mathbf{b}$.

Illustrate how to find $\mathbf{a} - \mathbf{b}$ geometrically.

$$\mathbf{a} - \mathbf{b} = \begin{pmatrix} 3 \\ 1 \end{pmatrix} - \begin{pmatrix} 2 \\ -4 \end{pmatrix}$$

$$= \begin{pmatrix} 3-2 \\ 1--4 \end{pmatrix}$$

$$= \begin{pmatrix} 1 \\ 5 \end{pmatrix}$$



F Practice! **VECTOR SUBTRACTION**

Example 9

Simplify $\overrightarrow{PQ} - \overrightarrow{RQ}$.

$-\overrightarrow{RQ} = \overrightarrow{QR}$

$\overrightarrow{PQ} + (-\overrightarrow{RQ})$

$\overrightarrow{PQ} + \overrightarrow{QR}$

$\overrightarrow{PR}$!

Practice- Solutions!

$$\begin{aligned} &\overrightarrow{PQ} - \overrightarrow{RQ} \\ &= \overrightarrow{PQ} + -\overrightarrow{RQ} \\ &= \overrightarrow{PQ} + \overrightarrow{QR} \qquad \{\overrightarrow{QR} = -\overrightarrow{RQ}\} \\ &= \overrightarrow{PR} \end{aligned}$$

F Practice! **VECTOR SUBTRACTION**

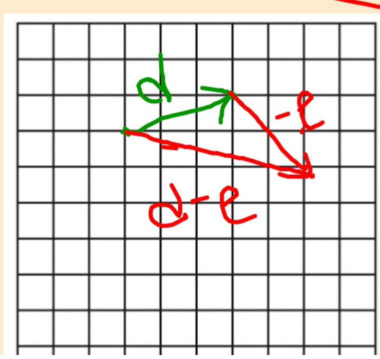
6 Suppose $\mathbf{d} = \begin{pmatrix} 3 \\ 1 \end{pmatrix}$ and $\mathbf{e} = \begin{pmatrix} -2 \\ 2 \end{pmatrix}$. $-\mathbf{e} = \begin{pmatrix} 2 \\ -2 \end{pmatrix}$

a Draw a vector diagram to illustrate $\mathbf{d} - \mathbf{e}$.

b Find $\mathbf{d} - \mathbf{e}$ in component form.

c Find: **i** $2\mathbf{e} + 3\mathbf{d}$ **ii** $4\mathbf{d} - 3\mathbf{e}$

Show 6cii) Graphically!



F Practice! **VECTOR SUBTRACTION**

6 Suppose $\mathbf{d} = \begin{pmatrix} 3 \\ 1 \end{pmatrix}$ and $\mathbf{e} = \begin{pmatrix} -2 \\ 2 \end{pmatrix}$.

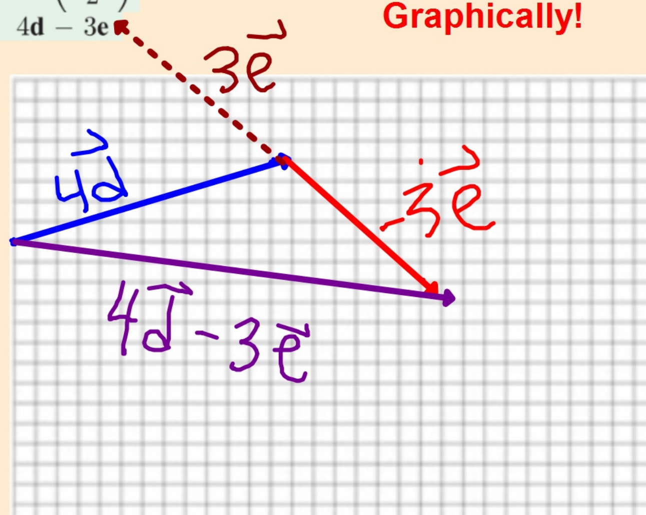
c Find: **i** $2\mathbf{e} + 3\mathbf{d}$ **ii** $4\mathbf{d} - 3\mathbf{e}$

Show 6cii) Graphically!

$$4d - 3e = 4\begin{pmatrix} 3 \\ 1 \end{pmatrix} - 3\begin{pmatrix} -2 \\ 2 \end{pmatrix}$$

$$4d - 3e = \begin{pmatrix} 12 \\ 4 \end{pmatrix} + \begin{pmatrix} 6 \\ -6 \end{pmatrix}$$

$$4d - 3e = \begin{pmatrix} 18 \\ -2 \end{pmatrix}$$



F Practice! **VECTOR SUBTRACTION**

6 Suppose $\mathbf{d} = \begin{pmatrix} 3 \\ 1 \end{pmatrix}$ and $\mathbf{e} = \begin{pmatrix} -2 \\ 2 \end{pmatrix}$.

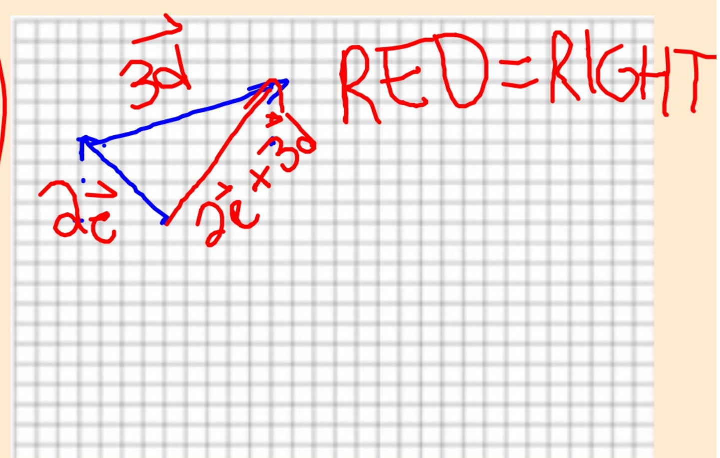
c Find: **i** $2\mathbf{e} + 3\mathbf{d}$ **ii** $4\mathbf{d} - 3\mathbf{e}$

$\Rightarrow \begin{pmatrix} 5 \\ 7 \end{pmatrix}$

$2e + 3d$

$2\begin{pmatrix} -2 \\ 2 \end{pmatrix} + 3\begin{pmatrix} 3 \\ 1 \end{pmatrix}$

$\begin{pmatrix} -4 \\ 4 \end{pmatrix} + \begin{pmatrix} 9 \\ 3 \end{pmatrix}$



$2e + 3d$

F Practice- Solutions! VECTOR SUBTRACTION

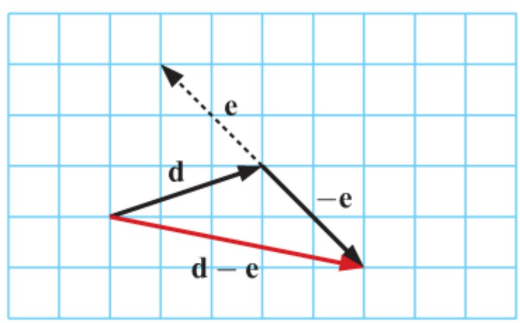
6 Suppose $\mathbf{d} = \begin{pmatrix} 3 \\ 1 \end{pmatrix}$ and $\mathbf{e} = \begin{pmatrix} -2 \\ 2 \end{pmatrix}$.

a Draw a vector diagram to illustrate $\mathbf{d} - \mathbf{e}$.

b Find $\mathbf{d} - \mathbf{e}$ in component form.

c Find: **i** $2\mathbf{e} + 3\mathbf{d}$ **ii** $4\mathbf{d} - 3\mathbf{e}$

6 a



b $\mathbf{d} - \mathbf{e} = \begin{pmatrix} 5 \\ -1 \end{pmatrix}$ **c i** $\begin{pmatrix} 5 \\ 7 \end{pmatrix}$ **ii** $\begin{pmatrix} 18 \\ -2 \end{pmatrix}$

Homework

Section 26F Even #s

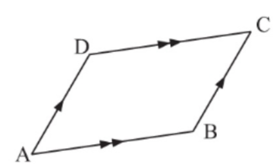
2 For the vectors $\mathbf{a} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} 4 \\ -1 \end{pmatrix}$, and $\mathbf{c} = \begin{pmatrix} -5 \\ 0 \end{pmatrix}$, find:

- **a** $\mathbf{a} - \mathbf{b}$
- **b** $\mathbf{b} - \mathbf{c}$
- **c** $\mathbf{c} - \mathbf{a}$
- **e** $\mathbf{a} + \mathbf{b} - \mathbf{c}$
- **f** $\mathbf{b} + 2\mathbf{c} - \mathbf{a}$
- **g** $\mathbf{a} - \frac{1}{2}\mathbf{b}$

3 Simplify:

- **a** $\overrightarrow{AB} - \overrightarrow{CB}$
- **b** $\overrightarrow{QP} - \overrightarrow{RP}$
- **c** $\overrightarrow{AB} + \overrightarrow{BC} - \overrightarrow{DC}$
- **d** $\overrightarrow{PQ} - \overrightarrow{RQ} + \overrightarrow{RS} - \overrightarrow{TS} + \overrightarrow{TV}$

4 ABCD is a parallelogram in which $\overrightarrow{AB} = \begin{pmatrix} 6 \\ 1 \end{pmatrix}$ and $\overrightarrow{BC} = \begin{pmatrix} 2 \\ 4 \end{pmatrix}$.



Find:

- **a** $\overrightarrow{DC}$
- **b** $\overrightarrow{DA}$
- **c** $\overrightarrow{AC}$
- **d** $\overrightarrow{BD}$

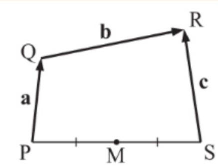
Homework

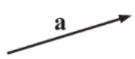
Section 26F Even #s

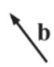
5 M is the midpoint of [PS]. $\overrightarrow{PQ} = \mathbf{a}$, $\overrightarrow{QR} = \mathbf{b}$, and $\overrightarrow{SR} = \mathbf{c}$.

Find, in terms of **a**, **b**, and **c**:

a $\overrightarrow{PR}$ **b** $\overrightarrow{QS}$ **c** $\overrightarrow{PS}$ **d** $\overrightarrow{PM}$



6 For 

and 

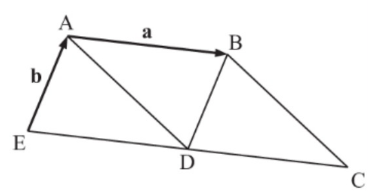
, draw vector diagrams for:

a $\mathbf{a} + \mathbf{b}$ **b** $\mathbf{a} - \mathbf{b}$ **c** $\mathbf{a} - 2\mathbf{b}$

7 ABDE and ABCD are parallelograms. Find, in terms of **a** and **b**, vector expressions for:

a $\overrightarrow{ED}$ **b** $\overrightarrow{DC}$ **c** $\overrightarrow{DB}$

d $\overrightarrow{AD}$ **e** $\overrightarrow{BC}$ **f** $\overrightarrow{EC}$

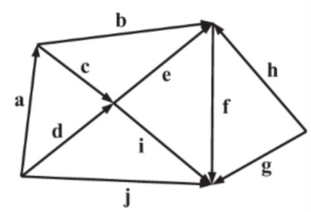


Homework Section 26F Even #s

8 Use the diagram to simplify:

a $\mathbf{a} + \mathbf{c}$ **b** $\mathbf{h} + \mathbf{f}$ **c** $\mathbf{j} - \mathbf{i}$

d $\mathbf{d} - \mathbf{c}$ **e** $\mathbf{e} - \mathbf{b}$ **f** $-\mathbf{f} - \mathbf{h}$



Solutions

EXERCISE 26F

1 **a** $\begin{pmatrix} -1 \\ 1 \end{pmatrix}$ **b** $\begin{pmatrix} 2 \\ 4 \end{pmatrix}$ **c** $\begin{pmatrix} 9 \\ -1 \end{pmatrix}$ **d** $\begin{pmatrix} 8 \\ -2 \end{pmatrix}$

e $\begin{pmatrix} 3 \\ 3 \end{pmatrix}$ **f** $\begin{pmatrix} 9 \\ 0 \end{pmatrix}$ **g** $\begin{pmatrix} -3 \\ 2 \end{pmatrix}$ **h** $\begin{pmatrix} 7 \\ -6 \end{pmatrix}$

i $\begin{pmatrix} -7 \\ -2 \end{pmatrix}$

2 **a** $\begin{pmatrix} -2 \\ 4 \end{pmatrix}$ **b** $\begin{pmatrix} 9 \\ -1 \end{pmatrix}$ **c** $\begin{pmatrix} -7 \\ -3 \end{pmatrix}$ **d** $\begin{pmatrix} 9 \\ 6 \end{pmatrix}$

e $\begin{pmatrix} 11 \\ 2 \end{pmatrix}$ **f** $\begin{pmatrix} -8 \\ -4 \end{pmatrix}$ **g** $\begin{pmatrix} 0 \\ \frac{7}{2} \end{pmatrix}$ **h** $\begin{pmatrix} 23 \\ 5 \end{pmatrix}$

3 **a** $\overrightarrow{AC}$ **b** $\overrightarrow{QR}$ **c** $\overrightarrow{AD}$ **d** $\overrightarrow{PV}$

Homework

Solutions

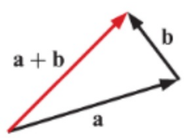
Section 26F Even #s

4 **a** $\begin{pmatrix} 6 \\ 1 \end{pmatrix}$ **b** $\begin{pmatrix} -2 \\ -4 \end{pmatrix}$ **c** $\begin{pmatrix} 8 \\ 5 \end{pmatrix}$ **d** $\begin{pmatrix} -4 \\ 3 \end{pmatrix}$

5 **a** $\overrightarrow{PR} = \mathbf{a} + \mathbf{b}$ **b** $\overrightarrow{QS} = \mathbf{b} - \mathbf{c}$

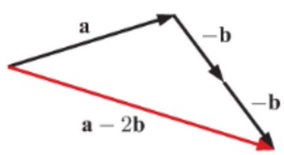
c $\overrightarrow{PS} = \mathbf{a} + \mathbf{b} - \mathbf{c}$ **d** $\overrightarrow{PM} = \frac{1}{2}(\mathbf{a} + \mathbf{b} - \mathbf{c})$

6 **a**



b

c



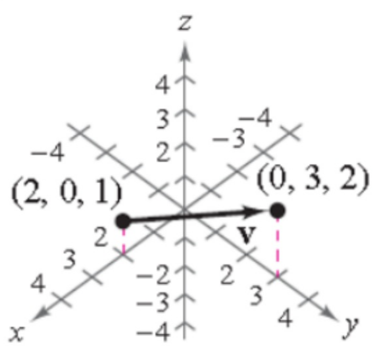
7 **a** $\mathbf{a}$ **b** $\mathbf{a}$ **c** $\mathbf{b}$ **d** $\mathbf{a} - \mathbf{b}$ **e** $-\mathbf{b} + \mathbf{a}$ **f** $2\mathbf{a}$

8 **a** $\mathbf{d}$ **b** $\mathbf{g}$ **c** $\mathbf{d}$ **d** $\mathbf{a}$ **e** $-\mathbf{c}$ **f** $-\mathbf{g}$

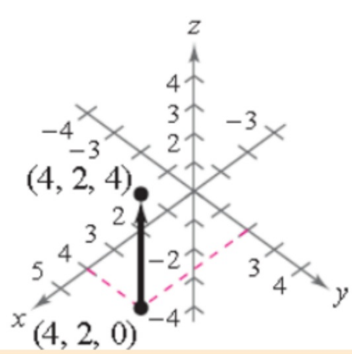
3-D Vector Practice

Directions: (a) Write the component form of vector **v**.
(b) Then sketch vector **v** with its initial point at the origin.

1)



2)



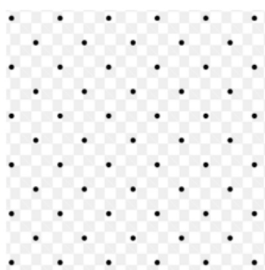
)

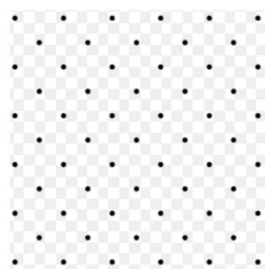
3-D Vector Practice

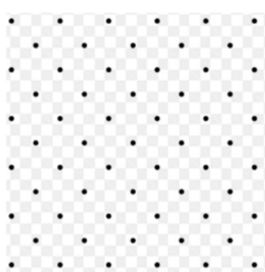
3) Given vector **v**, apply the scalar multiplication and sketch the vector with its initial point at the origin.

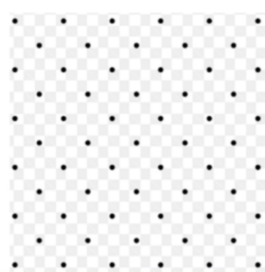
$\mathbf{v} = \langle 1, 1, 3 \rangle$

(a) $2\mathbf{v}$ (b) $-\mathbf{v}$ (c) $\frac{3}{2}\mathbf{v}$ (d) $0\mathbf{v}$







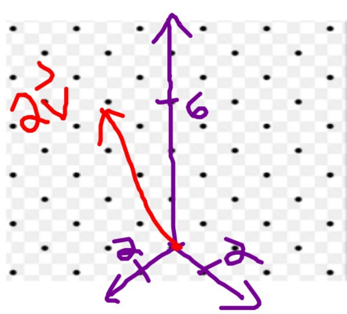


3-D Vector Practice

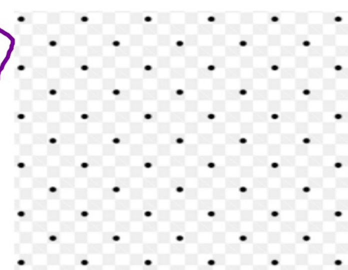
3) Given vector **v**, apply the scalar multiplication and sketch the vector with its initial point at the origin.

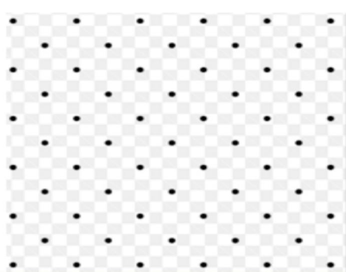
$\mathbf{v} = \langle 1, 1, 3 \rangle$

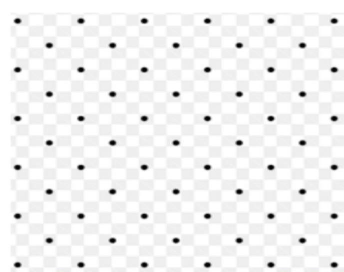
(a) $2\mathbf{v}$ (b) $-\mathbf{v}$ (c) $\frac{3}{2}\mathbf{v}$ (d) $0\mathbf{v}$



$2\vec{v} = \langle 2, 2, 6 \rangle$



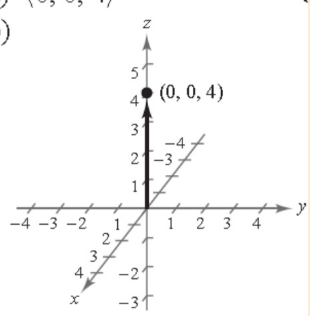




3-D Vector Practice Solutions

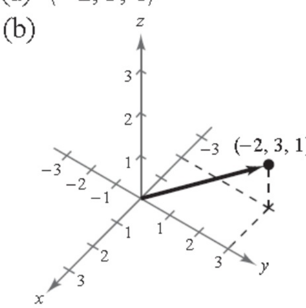
(a) $\langle 0, 0, 4\rangle$

(b)



(a) $\langle -2, 3, 1\rangle$

(b)



3-D Vector Practice Solutions