

2. Here is the key to the Viginere cipher:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
A	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
B	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A
C	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B
D	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C
E	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D
F	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E
G	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F
H	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G
I	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H
J	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I
K	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J
L	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K
M	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L
N	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M
O	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N
P	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Q	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
R	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
S	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
T	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
U	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
V	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
W	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
X	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
Y	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
Z	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y

Encode the message “BEWARE OF DRAGONS” using the Viginere cipher, with the keyword “ANT”.

Message:	B	E	W	A	R	E	O	F	D	R	A	G	O	N	S
Repeated keyword:	A	N	T	A	N	T	A	N	T	A	N	T	A	N	T
Encoded message:	?	R	?	?	?	?	?	?	?	?	?	?	?	?	?

Hint: The letter “R” in the third row comes from looking at row N, column E of the Viginere cipher table.

Now use the Viginere cipher, with the keyword “MATH”, to decode the following secret message: “OHHWAFYAMIEZRIKZF”.

Hint: Use this table:

Message:																	
Repeated keyword:	M	A	T	H	M	A	T	H	M	A	T	H	M	A	T	H	M
Encoded message:	O	H	H	W	A	F	Y	A	M	I	E	Z	R	I	K	Z	F

3. Matt weighs 150 lbs, Kristin weighs 125 lbs, and Jeff weighs 175 lbs. What is their average weight?

4. 75 people weigh 120 lbs each. What is their average weight?

5. Three people are in an elevator. Their average weight is 150 lbs. What is the total weight of all the people in the elevator?

6. Fifteen people are in an elevator. Their average weight is 140 lbs. The elevator is designed to hold at most 2000 lbs. Is it safe for them to ride in the elevator?

7. Twelve people are in an elevator which can carry at most 2000 lbs. The average weight of the people in the elevator is 160 lbs. If you weigh 75 lbs, is it safe for you to get on the elevator?

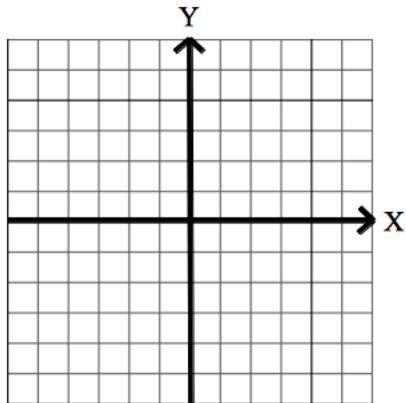
8. Three people are in an elevator. Their average weight is 150 lbs. Somebody gets on the elevator who weighs 350 lbs. What is the new average weight of people in the elevator?

9. Three people are in an elevator. Their average weight is 150 lbs. A fourth person then gets on the elevator. What should the fourth person's weight be in order to make the average weight of people on the elevator equal to 160 lbs?

14. Sarah and Sally have a pet dog who always stands exactly in the middle of the two of them. Sarah moves 4 meters to the right and Sally moves 8 meters in the same direction. How far does the dog move?

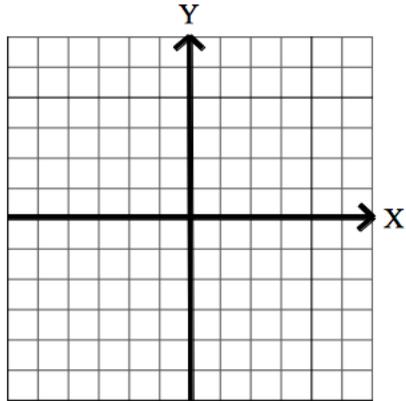
15. Sarah moves 3 meters to the left and Sally moves 5 meters to the right. Which direction does the dog move? How far does the dog move?

16. The point A has coordinates $(1,3)$ and the point B has coordinates $(5,5)$. Plot the points A and B:



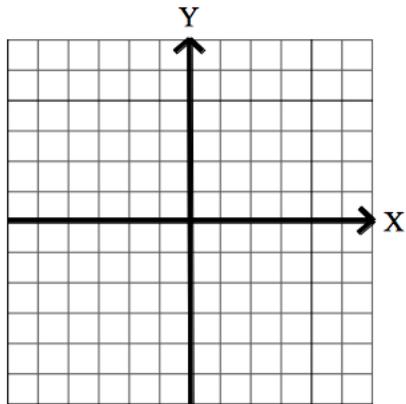
Plot the point C which is exactly in the middle of A and B. What are the coordinates of the point C?

17. The point A has coordinates $(-1,-3)$ and the point B has coordinates $(5,5)$. Plot the points A and B:

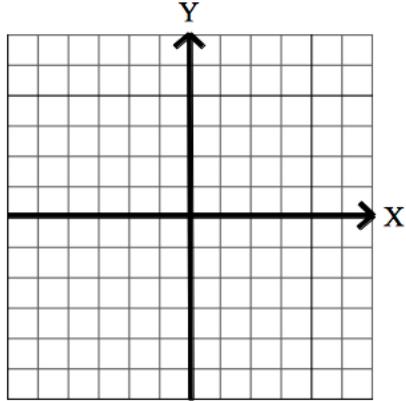


Plot the point C which is exactly in the middle of A and B. What are the coordinates of the point C?

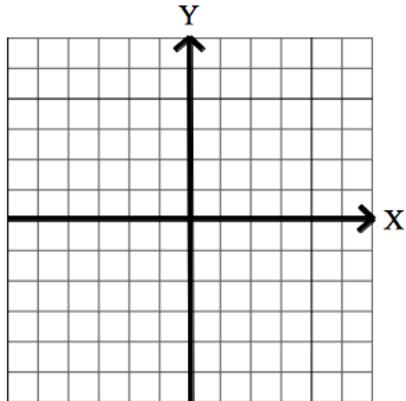
18. The point A has coordinates $(-4,-2)$. The point C has coordinates $(0,0)$. The point C is exactly in the middle of points A and B. What are the coordinates of the point B? Plot these points below.



19. The point A has coordinates $(-4,2)$. The point C has coordinates $(0,2)$. The point C is exactly in the middle of points A and B. What are the coordinates of the point B? Plot these points below.



20. The point A has coordinates $(-4,2)$. The point C has coordinates $(-1,1)$. The point C is exactly in the middle of points A and B. What are the coordinates of the point B? Plot these points below.



21. You meet a woman who lives on the Island of Knights and Liars. You must figure out if she is a Knight or a Liar, and you can only ask her one yes or no question. What question would you ask?

22. James, who lives on the Island of Knights and Liars, is standing at a fork in the road. One direction leads to Fortune and the other direction leads to Doom. You must figure out which direction leads to Fortune, but you can only ask James one single yes or no question. What question would you ask?

Dragon vs. Dragon!

A dragon with three heads and four tails fights a dragon with four heads and three tails! The dragons take turns, and each dragon gets one attack per turn. Even if a dragon has lost all its heads, it can still attack with one of its tails!

With each attack, a dragon can either: cut off 1 head, cut off 2 heads, cut off 1 tail, or cut off two tails of the opposing dragon.

Remember the rules:

- If you cut off 1 head, then 2 heads immediately grow instead.
- If you cut off 2 heads, nothing grows back.
- If you cut off 1 tail, then 2 tails immediately grow back.
- If you cut off 2 tails, then 1 head immediately grows back.

A dragon is slayed once it has lost all its heads and all its tails.

Play out the dragon fight with someone at your table and see who wins. The dragon with four heads and three tails makes the first attack.