DIRECTED NUMBERS

Ex. 1 Temperature

1. Listed below are the temperatures of some places one day in January, in degrees Celsius.

Augsburg	-6°	**B**erlin	3°	**C**hita	-20°
Dresden	0°	**E**dinburgh	-2°	**F**lorence	10°
Glasgow	-3°	**H**alifax	5°	**I**stanbul	4°
Jaslo	-9°	**K**refeld	-1°	**L**ondon	8°
Moscow	-15°	**N**ancy	-4°	**O**slo	-7°
Paris	6°	**Q**uin	2°	**R**yazan	-14°

(a) Which place is the warmest?

(b) Which place is the coldest?

(c) Calculate the temperature difference between:

    (i) Augsburg and Berlin   (ii) Edinburgh and Florence   (iii) Moscow and Oslo

    (iv) Jaslo and Krefeld   (v) Quin and Ryazan.

(d) Using the initial letter, write the places in order of temperature, from coldest to warmest.

2. Write down temperatures that are:

(a) 6 degrees lower than: (i) 5 °C   (ii) 0 °C   (iii) -2 °C

(b) 4 degrees higher than: (i) 2 °C   (ii) -1 °C   (iii) -7 °C

3. When a freezer is defrosted the temperature rises from -12 °C to 10 °C.

   By how many degrees did the temperature rise?

4. Write down the temperature difference in degrees between:

|			
(a) -3 °C and 2 °C	(b) -5 °C and 7 °C	(c) -7 °C and 8 °C	(d) -11 °C and 2 °C
(e) -4 °C and 4 °C	(f) -10 °C and 8 °C	(g) -2 °C and 25 °C	(h) -8 °C and 13 °C
(i) -9 °C and -2 °C	(j) -11 °C and -1 °C	(k) -27 °C and -5 °C	(l) -18 °C and -4 °C

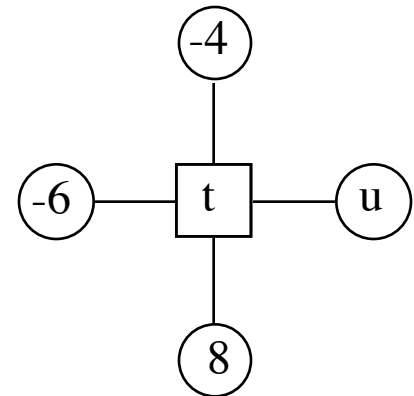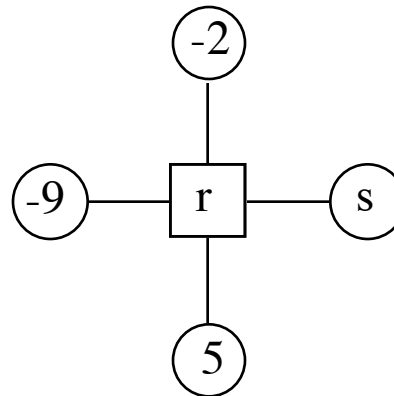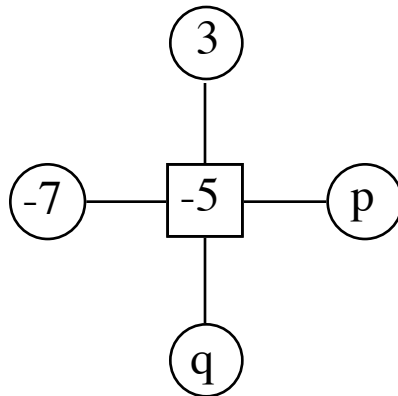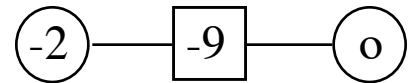## Ex. 2 Addition and Subtraction

Calculate the following:

1. (a) -4 + 7   (b) -9 + 4   (c) -7 + 6   (d) -6 + 9   (e) 5 + (-3)   (f) 4 + (-8)

   (g) 7 + (-1)   (h) 6 + (-5)   (i) -4 + (-1)   (j) -3 + (-6)   (k) -8 + (-7)   (l) -1 + (-1)

2. (a) -12 + 16   (b) -15 + 9   (c) -8 + 13   (d) -7 + 18   (e) 7 + (-19)   (f) 10 + (-2)

   (g) 9 + (-11)   (h) 12 + (-19)   (i) -6 + (-15)   (j) -19 + (-3)   (k) -17 + (-2)   (l) -19 + (-10)

3. (a) 1 - 8   (b) 2 - 3   (c) 1 - 5   (d) 7 - 9   (e) -5 - 1   (f) -3 - 7

   (g) -2 - 2   (h) -1 - 8   (i) -7 - 8   (j) -6 - 2   (k) -4 - 7   (l) -2 - 1

4. (a) 9 - 13   (b) 6 - 19   (c) 5 - 20   (d) 28 - 30   (e) -3 - 11   (f) -2 - 10

   (g) -17 - 4   (h) -1 - 12   (i) -17 - 1   (j) -13 - 12   (k) -22 - 7   (l) -12 - 18

5. (a) 2 - (-9)   (b) 3 - (-5)   (c) 6 - (-1)   (d) 8 - (-3)   (e) 5 - (-11)   (f) 10 - (-4)
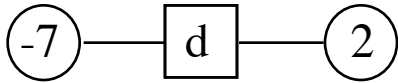
   (g) -3 - (-7)   (h) -4 - (-8)   (i) -8 - (-2)   (j) -5 - (-3)   (k) -2 - (-6)   (l) -9 - (-8)

In questions 6,7 and 8 the number in the square is the **sum** of the numbers in the circles on either side of it.

For example, since -5 + 9 = 4 the missing number in the square is 4 giving x = 4.

$$(-5) — \boxed{x} — (9)$$
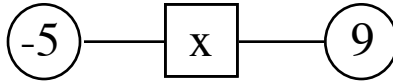
6. In each of the following calculate the values of a, b, c etc.

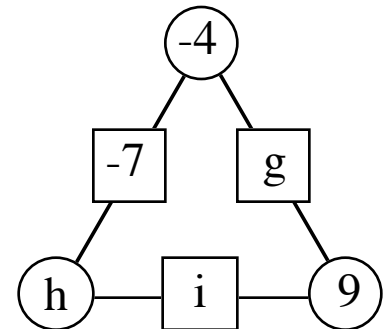$(-3) — \boxed{a} — (9)$ $(-1) — \boxed{b} — (6)$ $(-8) — \boxed{c} — (5)$

$(-7) — \boxed{d} — (2)$ $(-2) — \boxed{e} — (-3)$ $(-5) — \boxed{f} — (-1)$

$(-6) — \boxed{g} — (-4)$ $(-1) — \boxed{h} — (-5)$ $(-2) — \boxed{3} — (i)$

$(-5) — \boxed{2} — (j)$ $(-8) — \boxed{4} — (k)$ $(-4) — \boxed{5} — (1)$

$(-6) — \boxed{-8} — (m)$ $(-3) — \boxed{-7} — (n)$ $(-2) — \boxed{-9} — (o)$

(3)
    |
$(-7) — \boxed{-5} — (p)$
    |
(q)

(-2)
    |
$(-9) — \boxed{r} — (s)$
    |
(5)

(-4)
    |
$(-6) — \boxed{t} — (u)$
    |
(8)
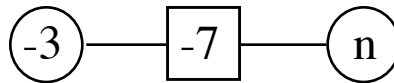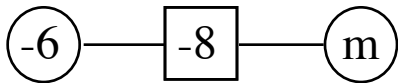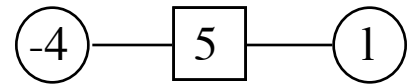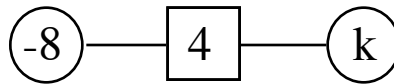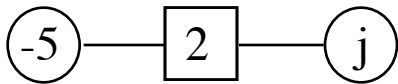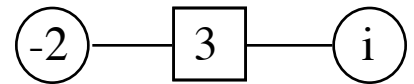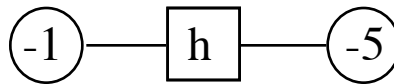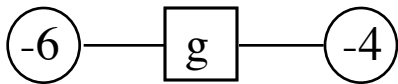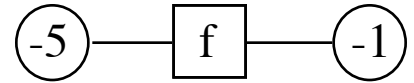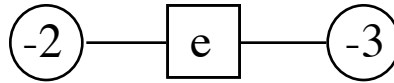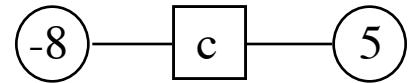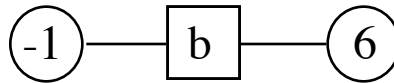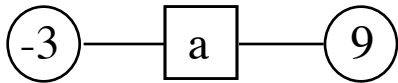
7. Copy the diagrams, fill in the missing numbers in the squares or circles and so calculate the values of a, b, c etc.

(5)
$\boxed{a}$ $\boxed{3}$
$(-3) — \boxed{c} — (b)$

(e)
$\boxed{-1}$ $\boxed{f}$
$(-4) — \boxed{d} — (-5)$

(-4)
$\boxed{-7}$ $\boxed{g}$
$(h) — \boxed{i} — (9)$
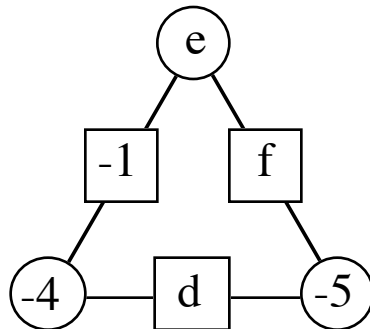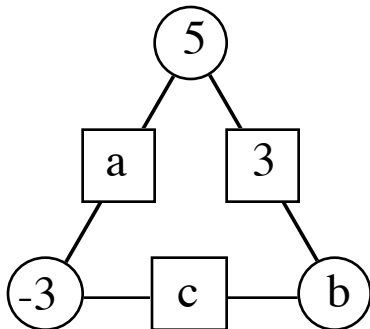
8. Copy the diagrams and fill in the missing numbers in the squares or circles.
The missing numbers are listed below each triangle and only these numbers are to be used.

-3 , 2 , 4 , 6   -6 , -1 , 2 , 5   -9 , -4 , 3 , 5
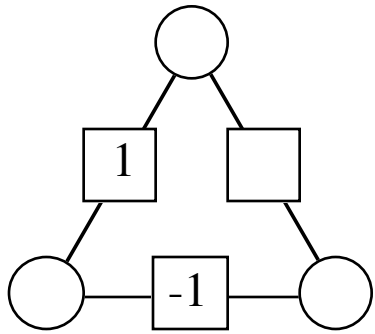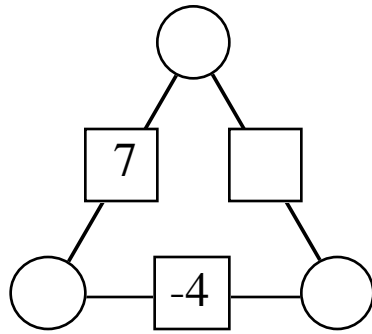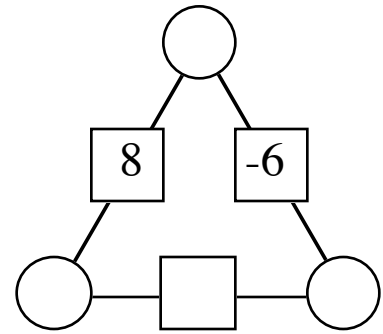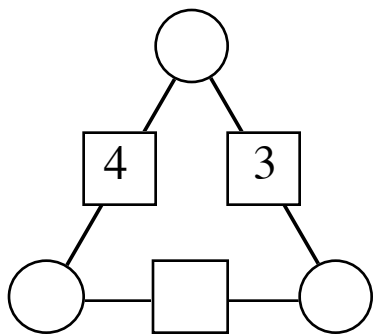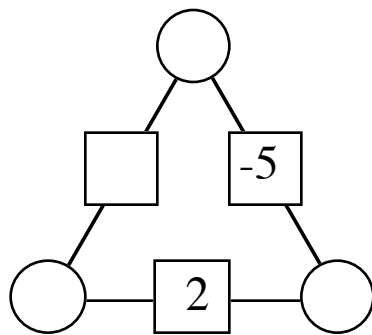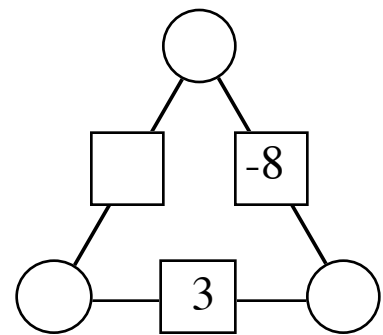
-2 , -3 , -5 , 6   -4 , -1 , 5 , 6   -7 , -3 , -1 , 4
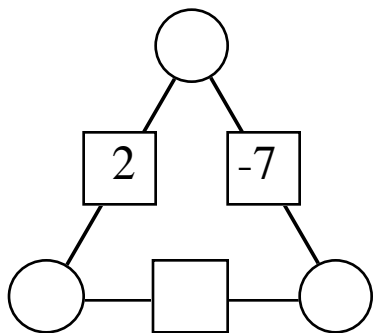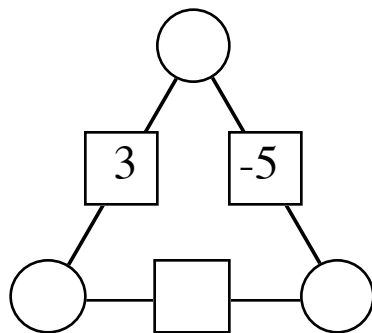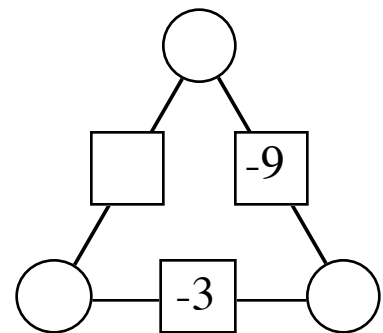
-4 , -3 , 1 , 5   -3 , -2 , 4 , 6   -7 , -2 , 2 , 4

Ex. 3 Multiplication

Calculate the following:

1. (a) -4 x 7   (b) -9 x 4   (c) -7 x 6   (d) -6 x 9   (e) 5 x (-3)   (f) 4 x (-8)
   (g) 7 x (-1)   (h) 6 x (-5)   (i) 4 x (-1)   (j) 3 x (-6)   (k) 8 x (-7)   (l) 1 x (-1)

2. (a) -2 x 6   (b) -5 x 9   (c) -8 x 3   (d) -6 x 8   (e) 7 x (-9)   (f) 0 x (-2)
   (g) 2 x (-1)   (h) 9 x (-9)   (i) 4 x (-5)   (j) 1 x (-3)   (k) 7 x (-2)   (l) 3 x (-7)

Ex. 4 Co-ordinates

1. Write the co-ordinates of the points A to Z. (notice there is no O, X or Y used for points).
   Write your answers as a list: A(2,5) , B(,) , C(,) , D(,) etc.
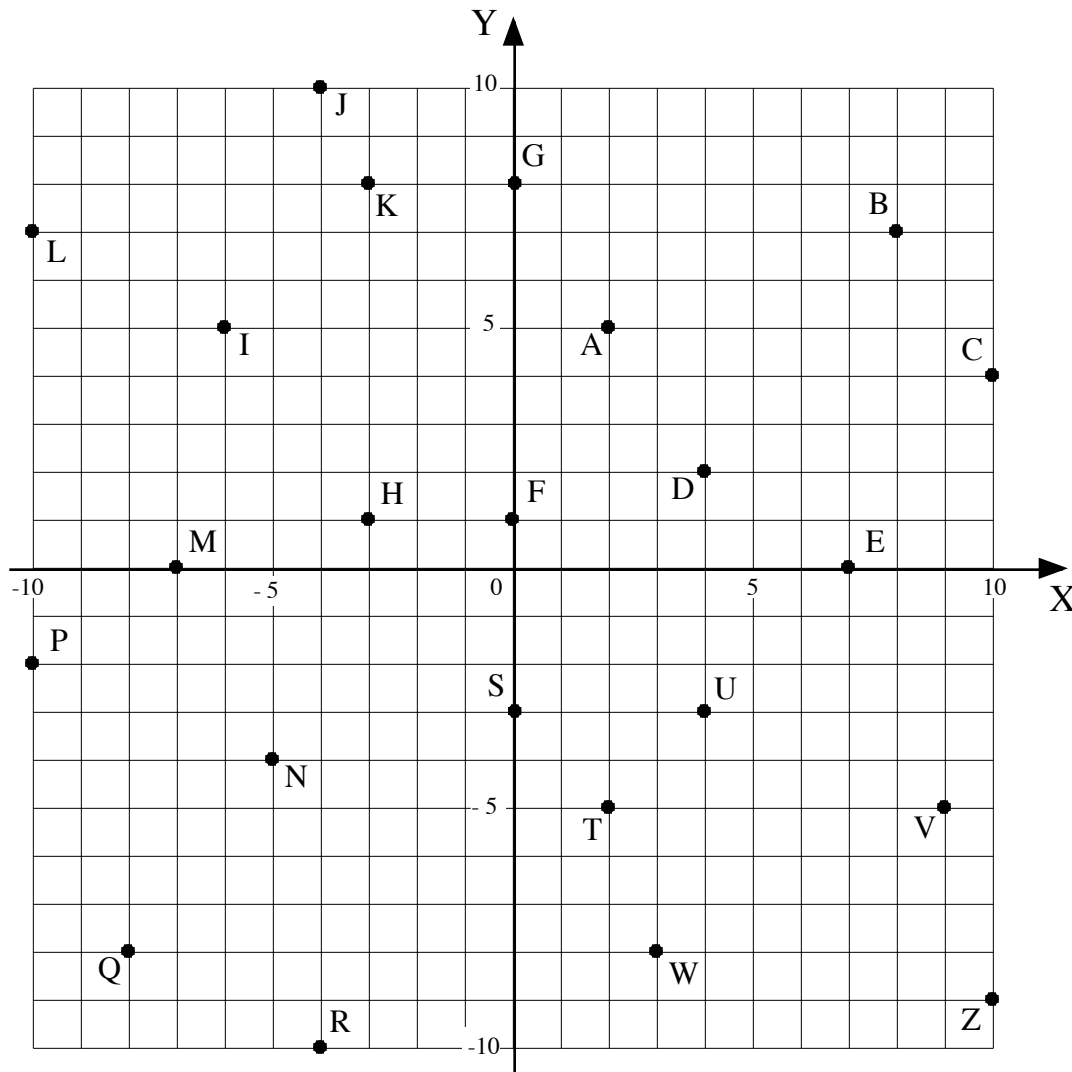
2. Draw a set of axes like that shown in question 1 above and then plot and label the points A to Z below.
   A(3,7) , B(2,6) , C(0,4) , D(6,9) , E(5,7) , F(2,8) , G(7,0) , H(-7,3) , I(-3,7) , J(-8,3) , K(-1,6) , L(-5,10)
   M(-6,0) , N(-8,-2) , P(-1,-4) , Q(-4,-9) , R(0,-7) , S(-9,-3) , T(3,-7) , U(5,-2) , V(9,-7) , W(1,-10) , Z(10,-3).

3. In each part draw a set of axes like that shown in question 1 but with a scale on each axis from -5 to 5.

   (a) Plot A(1,2), B(5,2) and C(5,5).   Find the co-ordinates of D so that ABCD is a rectangle.
   (b) Plot W(0,-4), X(-5,-4) and Y(-5,1). Find the co-ordinates of Z so that WXYZ is a rectangle.
   (c) Plot M(-1,2), N(-4,2) and P(-4,-2). Find the co-ordinates of Q so that MNPQ a rectangle.
   (d) Plot A(2,3), B(-5,3) and C(-5,-1).   Find the co-ordinates of D so that ABCD a rectangle.
   (e) Plot E(2,1), F(4,1) and G(4,-1).   Find the co-ordinates of H so that EFGH a square.
   (f) Plot W(4,4), X(4,-4) and Y(-4,4).   Find the co-ordinates of Z so that WXYZ a square.
   (g) Plot P(0,3), Q(3,0) and R(0,-5).   Find the co-ordinates of S so that PQRS a kite.
   (h) Plot A(5,3), B(3,5) and C(-3,3).   Find the co-ordinates of D so that ABCD a kite.
   (i) Plot E(2,1), F(0,-2) and G(-2,1).   Find the co-ordinates of H so that EFGH a rhombus.
   (j) Plot P(3,-1), Q(-1,-2) and R(-5,-1). Find the co-ordinates of S so that PQRS a rhombus.

4. Draw one set of axes like that shown in question 1 to use for the whole question.
   Plot and label the points given.
   Plot and label the position of the fourth point and draw the sides to complete the shape.
   State the of co-ordinates of the fourth point.

   (a) A(1,4), B(3,1) and C(9,5). Find D , so that ABCD is a rectangle.
   (b) E(-6,4), F(-2,3) and G(-1,7). Find H , so that EFGH is a square.
   (c) I(-4,0), J(0,-2) and K(-4,-10). Find L , so that IJKL is a rectangle.
   (d) M(1,-7), N(4,-1) and P(10,-4). Find Q , so that MNPQ is a square.

5.
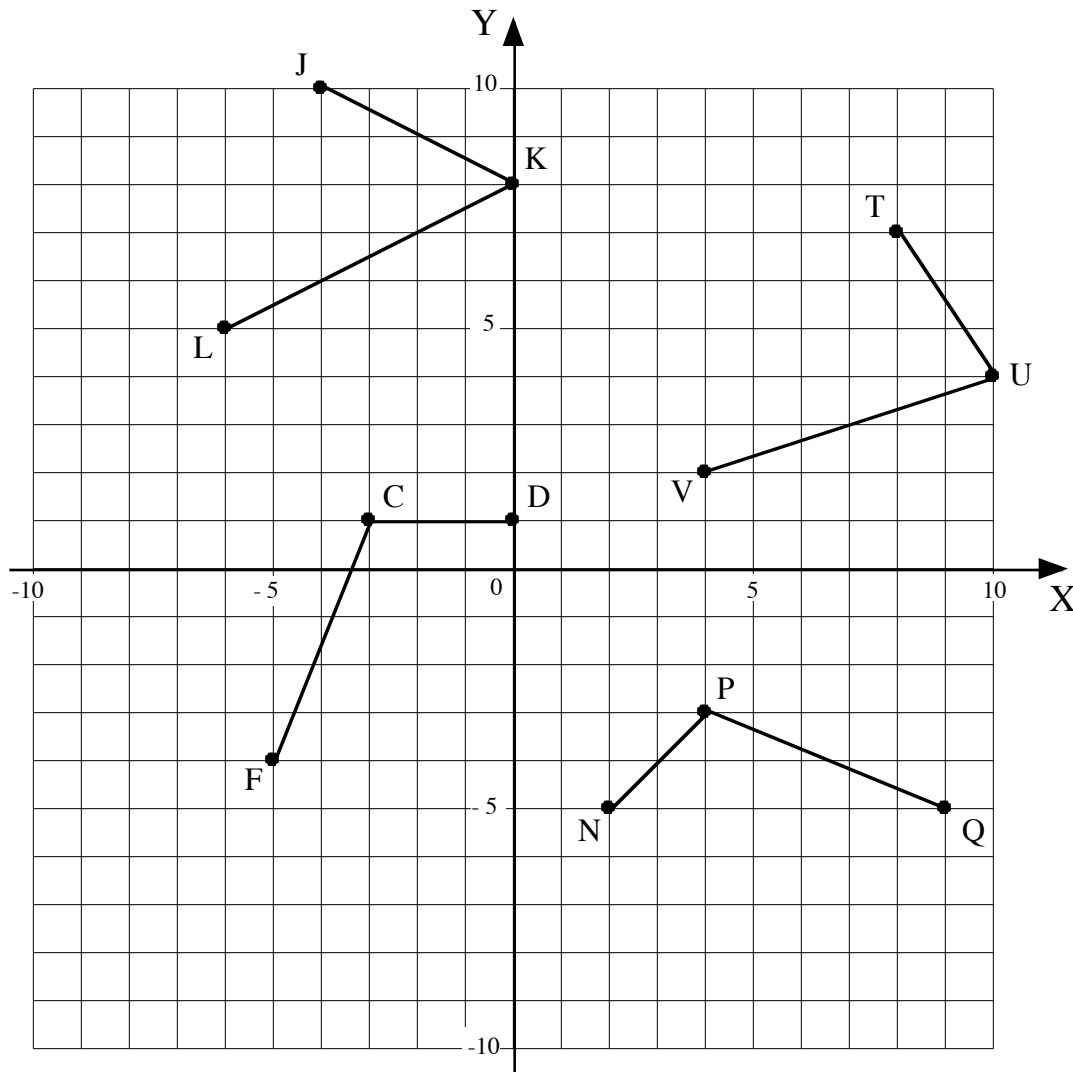
Make a copy of the diagram shown above.

Plot and label the position of the fourth point and draw the sides to complete the shape.
State the of co-ordinates of the fourth point:

(a) E , so that CDEF is a parallelogram.
(b) M , so that JKLM is a parallelogram.
(c) W , so that TUVW is a parallelogram.
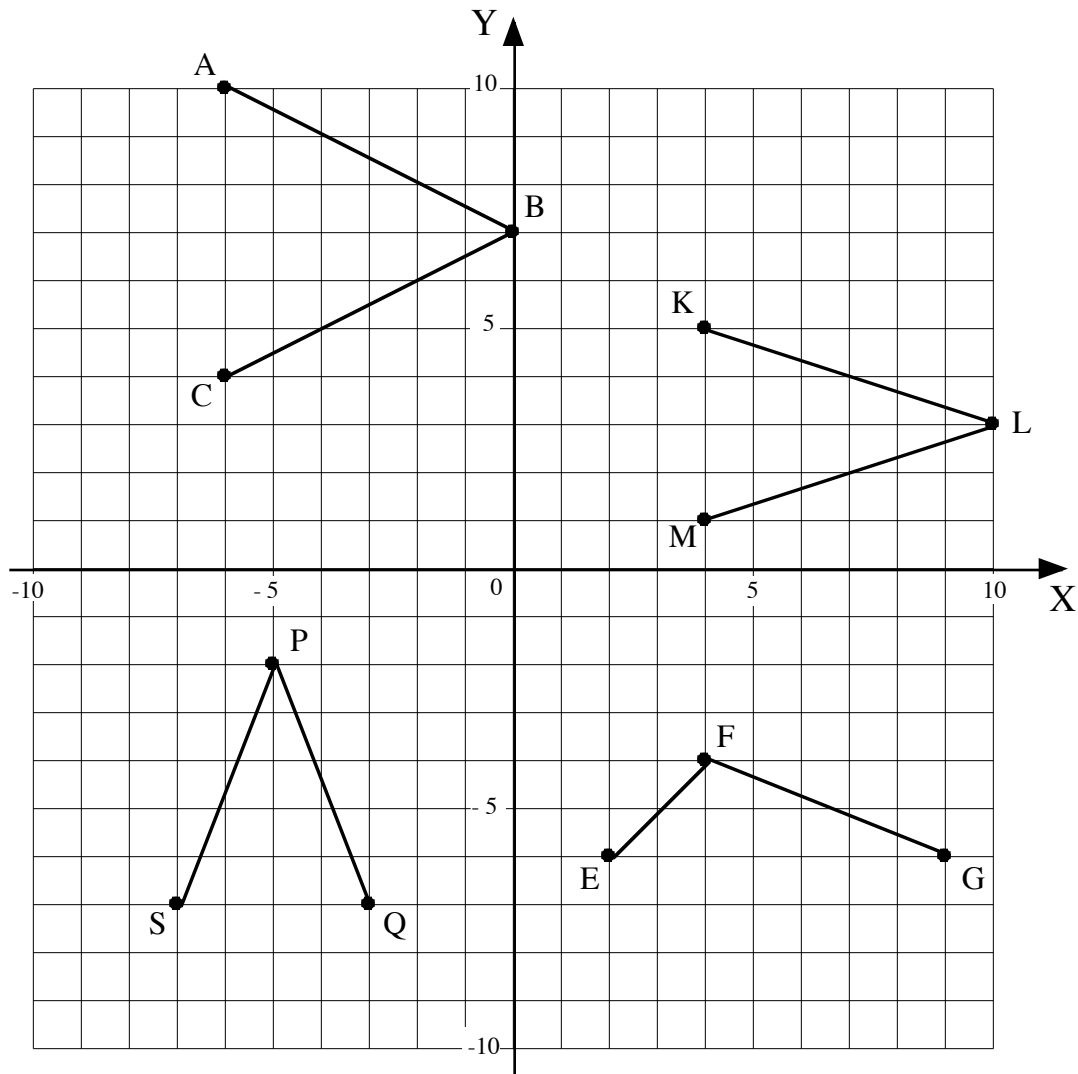(d) R , so that NPQR is a parallelogram.

6.

Make a copy of the diagram shown above.

Plot and label the position of the fourth point and draw the sides to complete the shape.

State the of co-ordinates of the fourth point:

(a) D , so that ABCD is a kite where BD=8 units

(b) H , so that EFGH is a kite.

(c) N , so that KLMN is a rhombus.

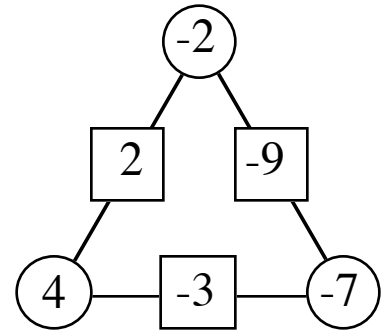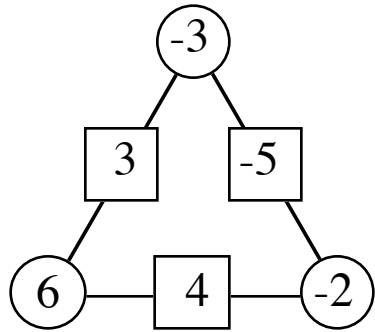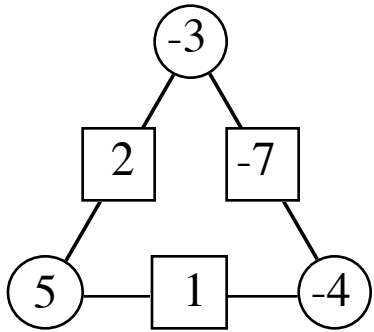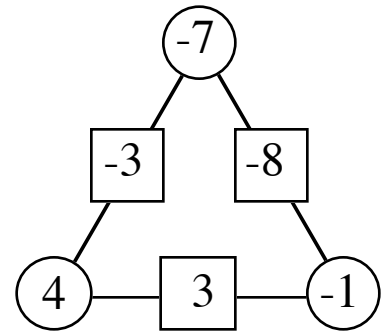(d) R , so that PQRS is a kite where PR=3 units.

ANSWERS

Ex. 1 Temperature

1. (a) Florence   (b) Chita   (c) (i) 9°C (ii) 12°C (iii) 8°C (iv) 8°C (v) 16°C
   (d) C, M, R, J, O, A, N, G, E, K, D, Q, B, I, H, P, L, F

2. (a) (i) -1°C (ii) -6°C (iii) -8°C   (b) (i) 6°C (ii) 3°C (iii) -3°C   3. 22°C

4. (a) 5 °C   (b) 12 °C   (c) 15 °C   (d) 13 °C   (e) 8 °C   (f) 18 °C
   (g) 27 °C   (h) 21 °C   (i) 7 °C   (j) 10 °C   (k) 22 °C   (l) 14 °C

Ex. 2 Addition and Subtraction

1. (a) 3   (b) -5   (c) -1   (d) 3   (e) 2   (f) -4
   (g) 6   (h) 1   (i) -5   (j) -9   (k) -15   (l) -2

2. (a) 4   (b) -6   (c) 5   (d) 11   (e) -12   (f) 8
   (g) -2   (h) -7   (i) -21   (j) -22   (k) -19   (l) -29

3. (a) -7   (b) -1   (c) -4   (d) -2   (e) -6   (f) -10
   (g) -4   (h) -9   (i) -15   (j) -8   (k) -11   (l) -3

4. (a) -4   (b) -13   (c) -15   (d) -2   (e) -14   (f) -12
   (g) -21   (h) -13   (i) -18   (j) -25   (k) -29   (l) -30

5. (a) 11   (b) 8   (c) 7   (d) 11   (e) 16   (f) 14
   (g) 4   (h) 4   (i) -6   (j) -2   (k) 4   (l) -1

6. a = 6   b = 5   c = -3   d = -5   e = -5   f = -6
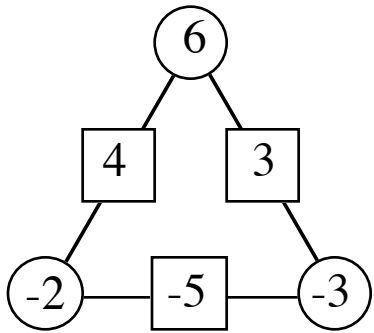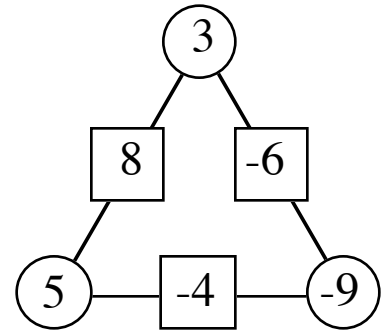   g = -10   h = -6   i = 5   j = 7   k = 12   l = 9
   m = -2   n = -4   o = -7   p = 2   q = -8   r = 3
   s = 12   t = 4   u = 10

7. a = 2   b = -2   c = -5   d = -9   e = 3   f = -2
   g = 5   h = -3   i = 6

8.

Triangle 1: top circle **4**; squares **1** and **6**; bottom circles **-3** and **2**; bottom square **-1**

Triangle 2: top circle **5**; squares **7** and **-1**; bottom circles **2** and **-6**; bottom square **-4**

Triangle 3: top circle **3**; squares **8** and **-6**; bottom circles **5** and **-9**; bottom square **-4**

Triangle 4: top circle **6**; squares **4** and **3**; bottom circles **-2** and **-3**; bottom square **-5**

Triangle 5: top circle **-1**; squares **5** and **-5**; bottom circles **6** and **-4**; bottom square **2**

Triangle 6: top circle **-7**; squares **-3** and **-8**; bottom circles **4** and **-1**; bottom square **3**

Triangle 7: top circle **-3**; squares **2** and **-7**; bottom circles **5** and **-4**; bottom square **1**

Triangle 8: top circle **-3**; squares **3** and **-5**; bottom circles **6** and **-2**; bottom square **4**

Triangle 9: top circle **-2**; squares **2** and **-9**; bottom circles **4** and **-7**; bottom square **-3**

Ex. 3 Multiplication

1. (a) -28   (b) -36   (c) -42   (d) -54   (e) -15   (f) -32
   (g) -7   (h) -30   (i) -4   (j) -18   (k) -56   (l) -1

2. (a) -12   (b) -45   (c) -24   (d) -48   (e) -63   (f) 0
   (g) -2   (h) -81   (i) -20   (j) -3   (k) -14   (l) -21

Ex. 4 Co-ordinates

1. A(2,5) , B(8,7) , C(10,4) , D(4,2) , E(7,0) , F(0,1) , G(0,8) , H(-3,1) , I(-6,5) , J(-4,10) , K(-3,8) , L(-10,7) ,

   M(-7,0) , N(-5,-4) , P(-10,-2) , Q(-8,-8) , R(-4,-10) , S(0,-3) , T(2,-5) , U(4,-3) , V(9,-5) , W(3,-8) , Z(10,-9)

2.
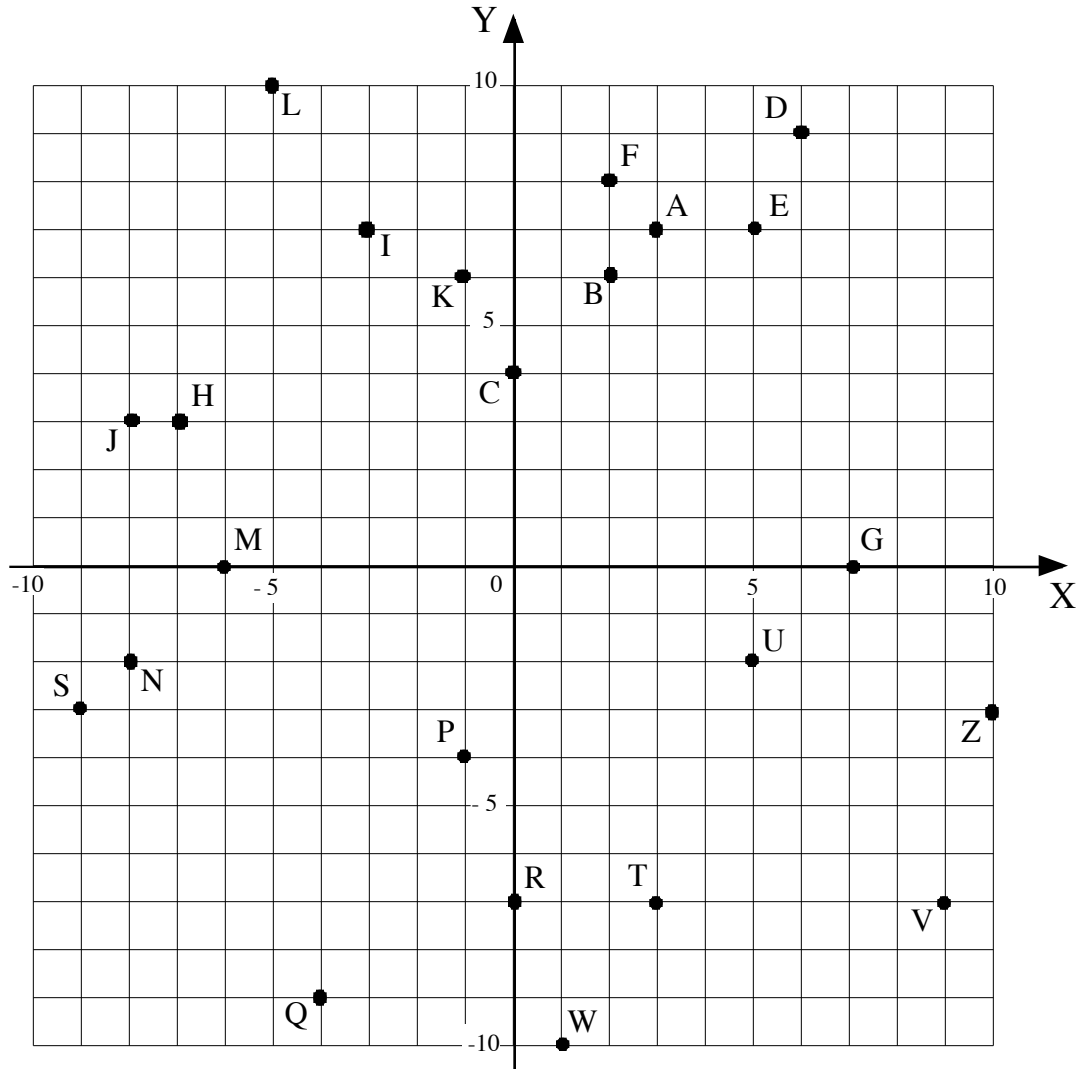
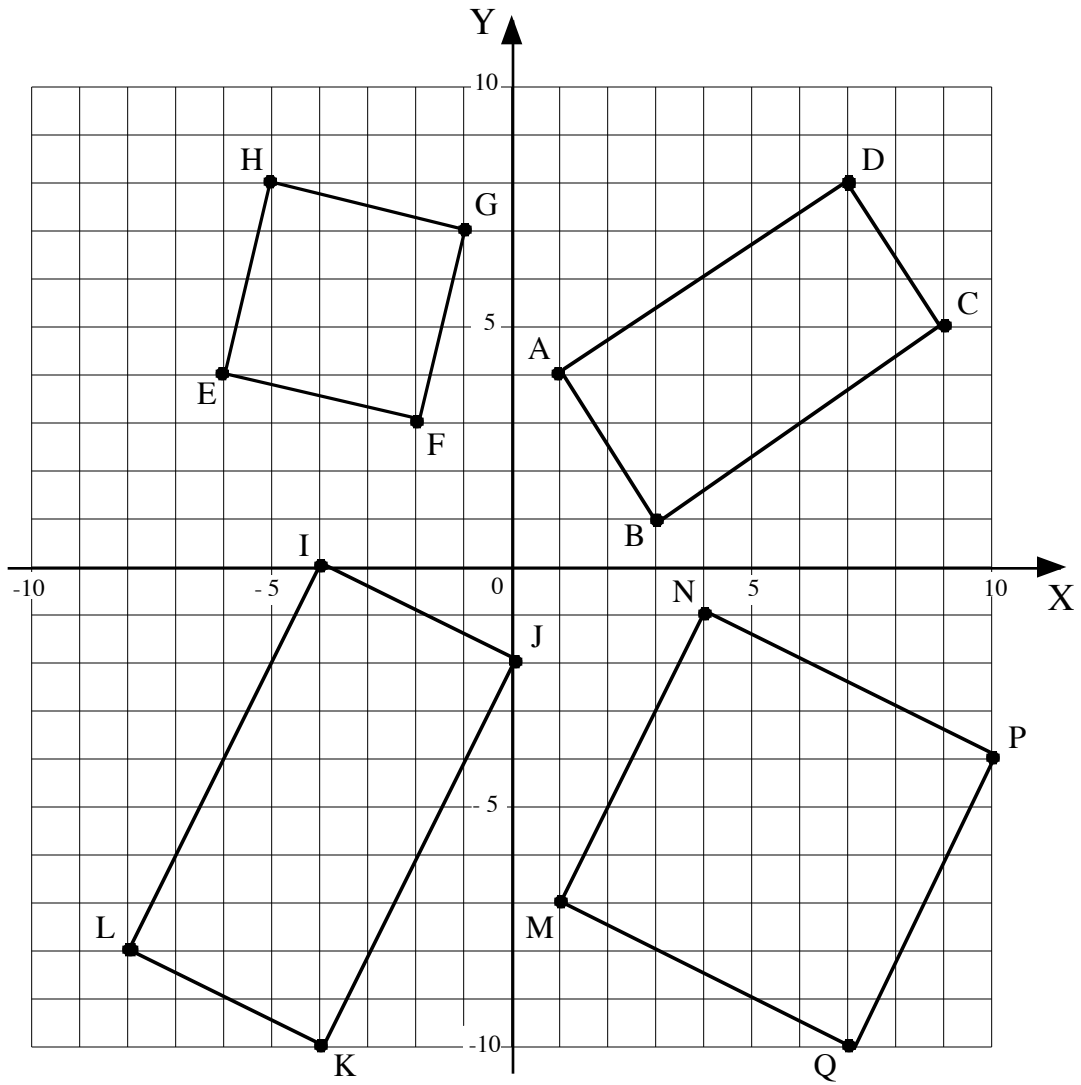3. (a) D (1,5)   (b) Z (0,1)   (c) Q (-1,-2)   (d) D (2,-1)   (e) H (2,-1)
    (f) Z (-4,-4)   (g) S (-3,0)   (h) D (3,1)   (i) H (0,4)   (j) S (-1,0)

4. (a) D (7,8)   (b) H (-5,8)   (c) L (-8,-8)   (d) Q (7,-10)
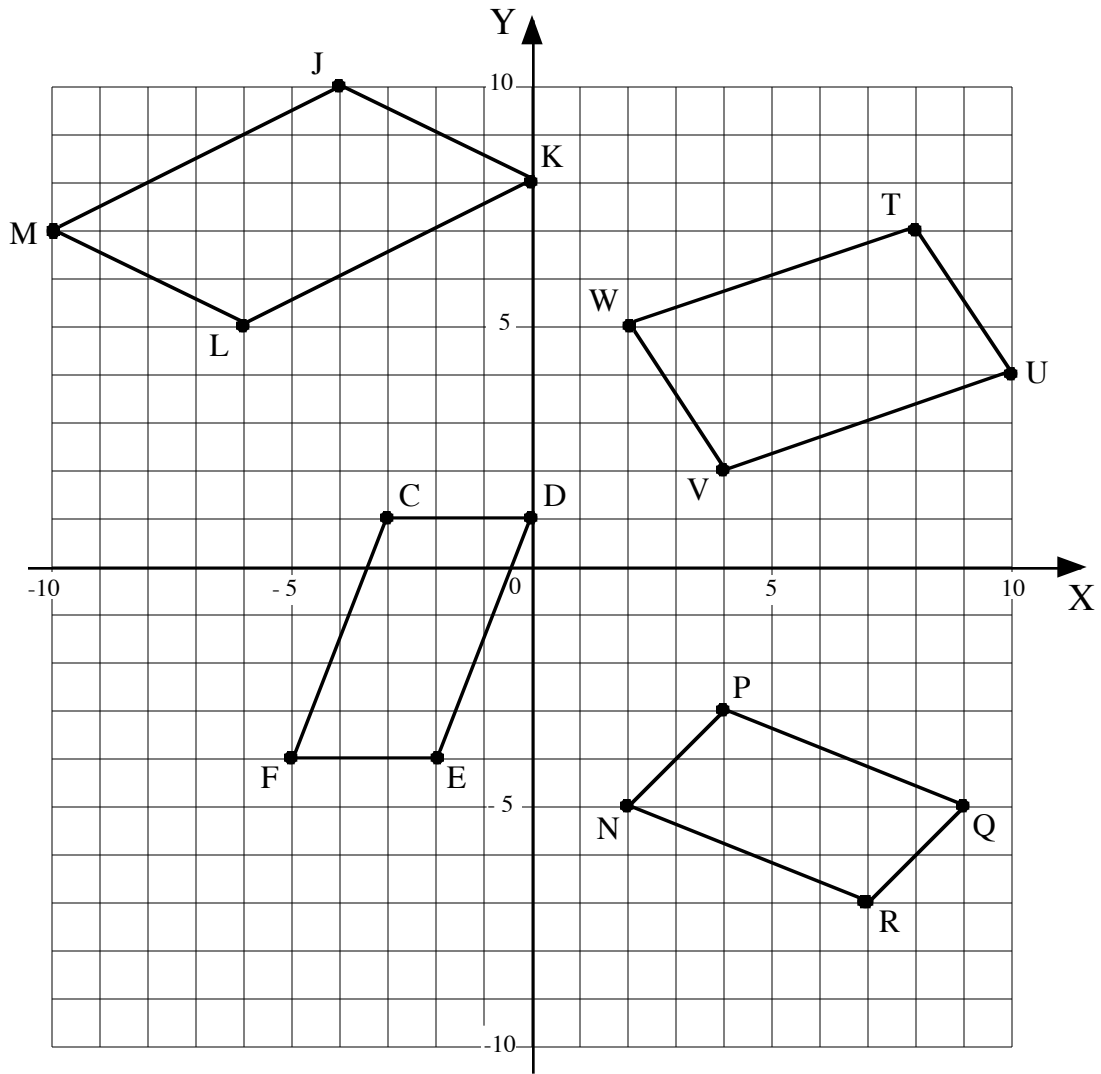
5. (a) E (-2,-4)   (b) M (-10,7)   (c) W (2,5)   (d) R (7,-7)

6. (a) D (-8,7)　　　　　(b) H (4,-8)　　　　　(c) N (-2,3)　　　　　(d) R (-5,-5)