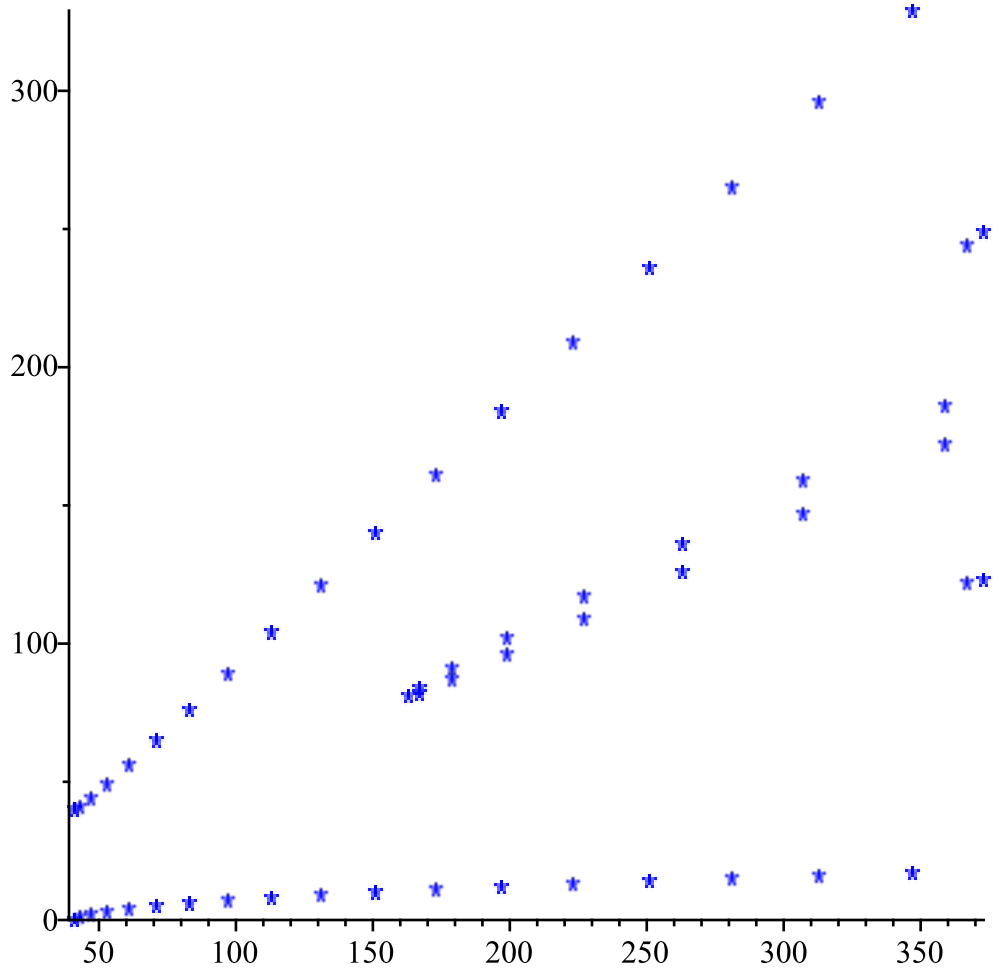
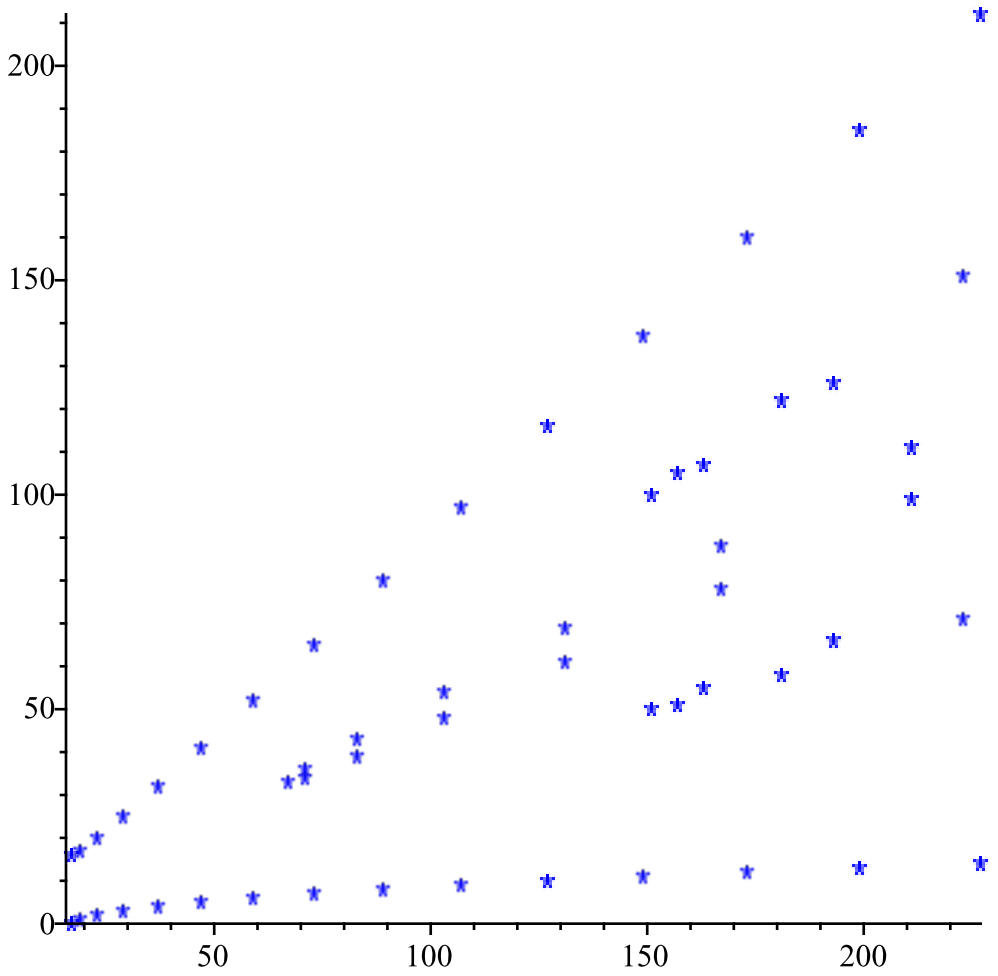
```
# Maple code for graph of discrete divisors
# prime producing trinomial for b^2 + b + p for p in {2, 3, 5, 11, 17, 41}

x := Vector[row](55) :
y := Vector[row](55) :
counter := 1 :

for a from 2 to 378 do
for b from 0 to a − 1 do
if mod(b^2 + b + 41, a) = 0
then x[counter] := a : y[counter] := b : counter := counter + 1;
end if;
end do:
end do:

#The number 378 was chosen by trial and error to completely fill the vector of length 55.
#The number 55 was chosen so that we can easily identify five parabolas from the data points
#This code creates a data set and stores it in two vectors.

plot(x, y, style = point, symbol = asterisk, color = blue)
```



```
# now for b^2 + b + 17
# note, data points at the origin, are okay

x := Vector[row](55) :
y := Vector[row](55) :
counter := 1 :

for a from 2 to 378 do
for b from 0 to a - 1 do
if mod(b^2 + b + 17, a) = 0
then x[counter] := a : y[counter] := b : counter := counter + 1;
end if;
end do:
end do:
```

Error, Vector index 56 out of range

```
# data in x and y vectors

plot(x, y, style = point, symbol = asterisk, color = blue)
```




```
# and interesting plot, and now moving on to the next plot
```

now for $b^2 + b + 11$

$x := Vector[row](55)$:
$y := Vector[row](55)$:
$counter := 1$:

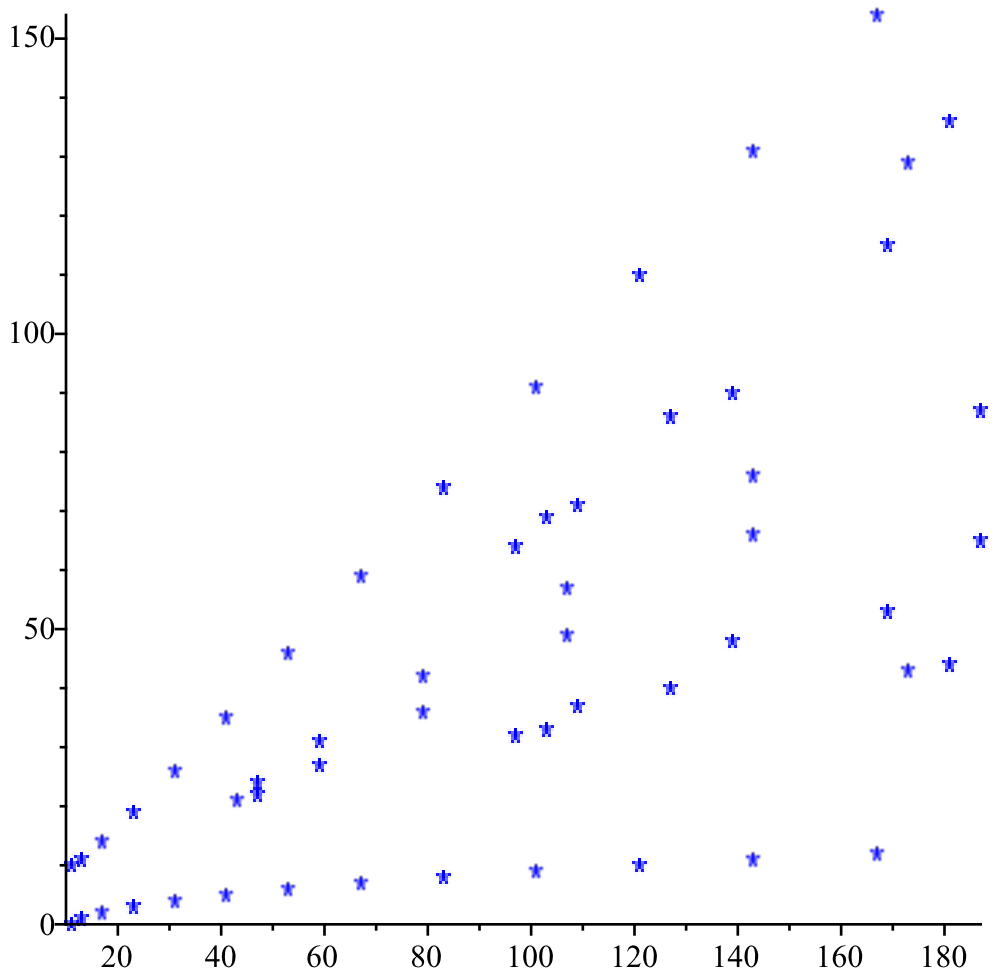
for a **from** 2 **to** 378 **do**
for b **from** 0 **to** $a - 1$ **do**
if mod$(b^2 + b + 11, a) = 0$
then $x[counter] := a : y[counter] := b : counter := counter + 1;$
end if;
end do:
end do:

Error, Vector index 56 out of range

 # Error, is just a warning, ignore, not going to cook this example graph (plot command)

 # data in x and y vectors

$plot(x, y, style = point, symbol = asterisk, color = blue)$



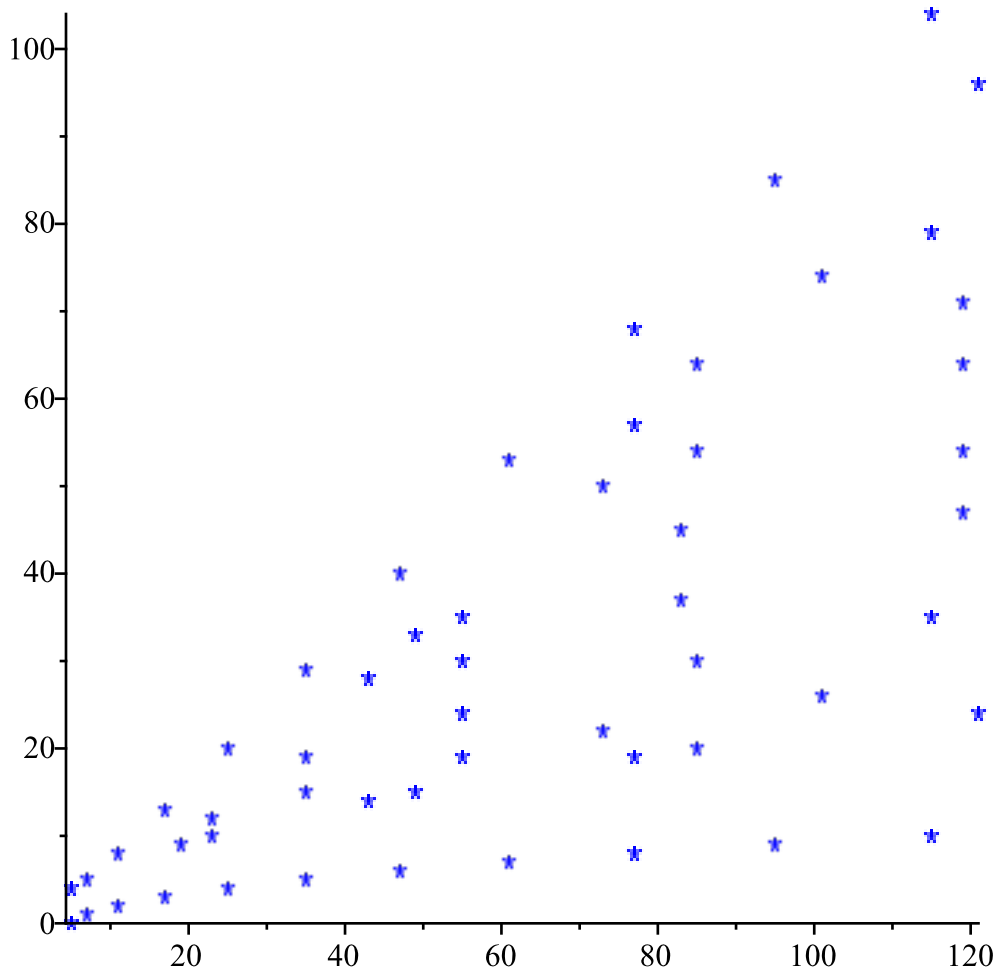
 # good plot

 # seven parabolas showing, this time, curve fit possible

```
# now for b^2 + b + 5

x := Vector[row](55) :
y := Vector[row](55) :
counter := 1 :
for a from 2 to 378 do
for b from 0 to a - 1 do
if mod(b^2 + b + 5, a) = 0
then x[counter] := a : y[counter] := b : counter := counter + 1;
end if;
end do:
end do:
```

Error, Vector index 56 out of range

```
# data in x and y vectors

plot(x, y, style = point, symbol = asterisk, color = blue)
```

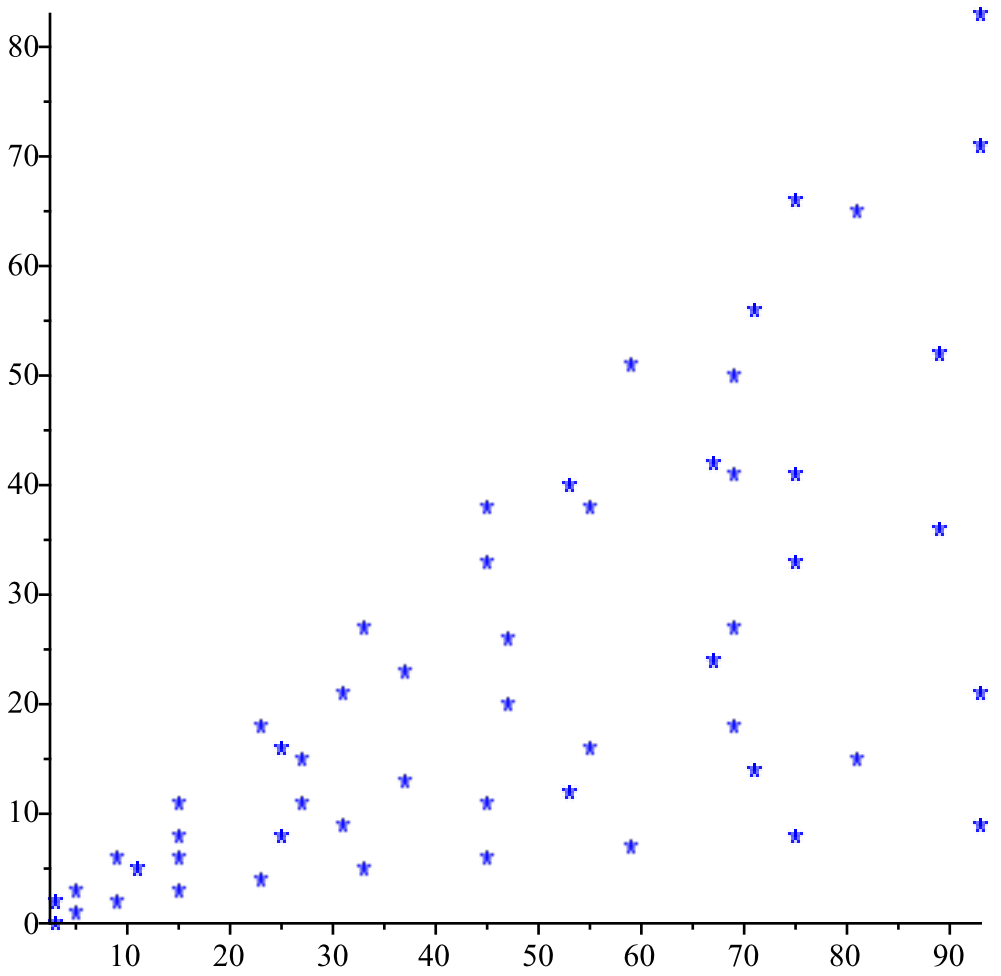


 # harder to see, but at least five parabolas, in this plot

```
# now for b^2 + b + 3

x := Vector[row](55) :
y := Vector[row](55) :
counter := 1 :

for a from 2 to 378 do
for b from 0 to a - 1 do
if mod(b^2 + b + 3, a) = 0
then x[counter] := a : y[counter] := b : counter := counter + 1;
end if;
end do:
end do:
```

Error, Vector index 56 out of range

```
# data in x and y vectors

plot(x, y, style = point, symbol = asterisk, color = blue)
```



 # parabolas very hard to see

 # more work is to find curve fit parametric parabolas

now for the last one, $b^2 + b + 2$

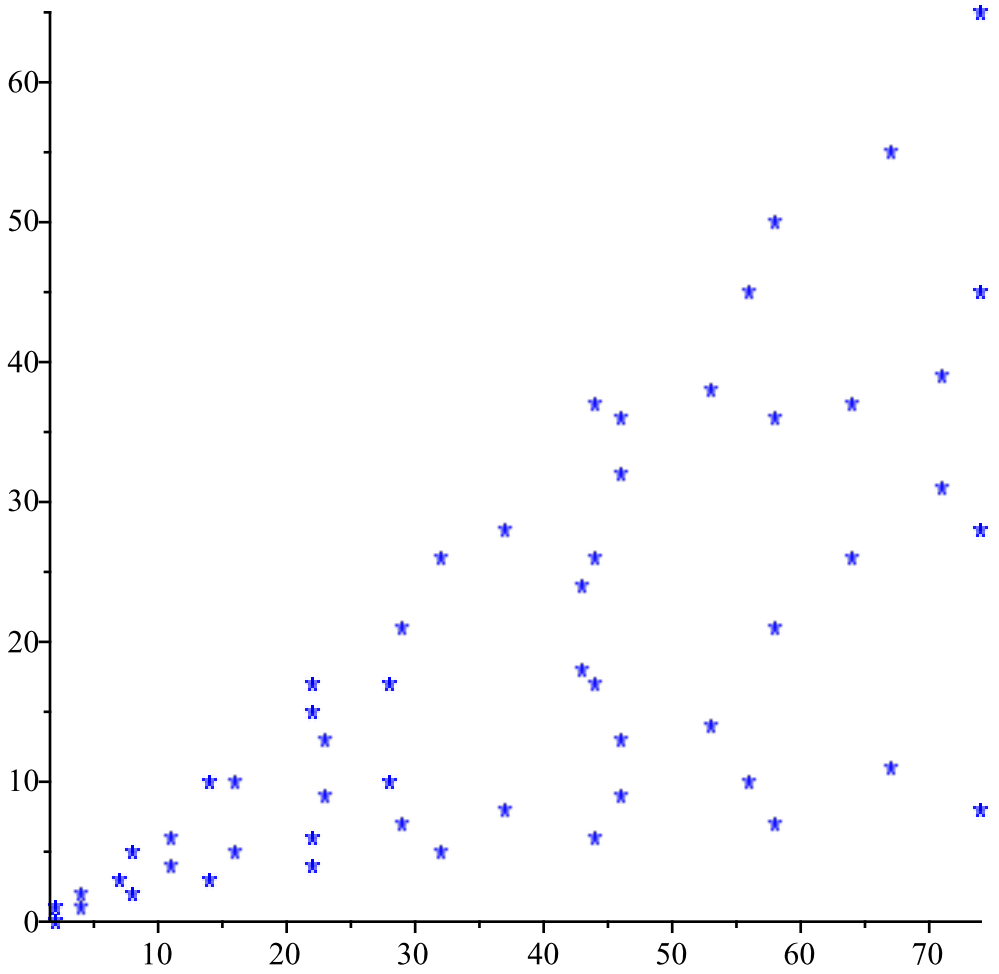
$x := Vector[row](55)$:
$y := Vector[row](55)$:
$counter := 1$:

for a **from** 2 **to** 378 **do**
for b **from** 0 **to** $a - 1$ **do**
if mod$(b^2 + b + 2, a) = 0$
then $x[counter] := a : y[counter] := b : counter := counter + 1;$
end if;
end do:
end do:

Error, Vector index 56 out of range

data in x and y vectors

$plot(x, y, style = point, symbol = asterisk, color = blue)$



the graph, or plot, for $b^2 + b + 2$ is messy,

 # but deterministic, and interesting,

 # and is the cases when $b^2 + b + 2$ *is a composite number*, **for** *a given value of* b,
under modular arithmetic