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| **Started on** | Wednesday, August 3, 2022, 7:14 AM |
| **State** | Finished |
| **Completed on** | Wednesday, August 3, 2022, 7:21 AM |
| **Time taken** | 7 mins 20 secs |
| **Marks** | 23.00/23.00 |
| **Grade** | **100.00** out of 100.00 |

**Question 1**

Correct

1.00 points out of 1.00

Flag question

## 1. GMT Maps

In this tutorial we will begin to use the map making capabilities of **GMT**.

Since we will be making some new files for this activity, you will need to create a new directory called **act5** inside your **groupwork** directory. What is the correct order of commands below to create, check, and then enter this **act5** directory?

| | |
|---|---|
| cd ~/groupwork | 1 ✓ |
| ls act5 | 3 ✓ |
| mkdir act5 | 2 ✓ |
| cd act5 | 4 ✓ |

Check

The correct answer is: cd ~/groupwork – 1, ls act5 – 3, mkdir act5 – 2, cd act5 – 4

Correct

Marks for this submission: 1.00/1.00.

**Question 2**

Correct

1.00 points out of 1.00

Flag question

In our previous tutorial we used the `psxy` command to make a simple X-Y plot of earthquake magnitude versus depth. Today we will use the same `psxy` command to make a map of earthquakes with the Mercator projection. It is common for maps to be made with the Mercator projection as it produces a nice rectangular view, but it is important to remember that since the Earth is not flat, it does do a poor job of plotting areas near the poles. To produce a Mercator map with GMT, the -J option is the key for indicating that you want that type of plot. What was the –J option we used to make an X-Y plot in the last activity?

Select one:

- a. -J X
- b. -JX ✓
- c. -XJ
- d. -J Y
- e. -y J
- f. -Jx

Check

The correct answer is: -JX

Correct

Marks for this submission: 1.00/1.00.

**Question 3**

Correct

1.00 points out of 1.00

Flag question

You will need to specify `-JM` for a Mercator map. You still need a number at the end of the option to specify how big the X-axis should be in inches (the size of the Y-axis will be calculated for the Mercator projection). What should the full –J option be if we want to plot a map that is 6 inches wide?

Answer: -JM6 ✓

Check

The correct answer is: -JM6

Correct

Marks for this submission: 1.00/1.00.

**Question 4**

Correct

1.00 points out of 1.00

Flag question

To begin making a map, you will need to copy the same earthquake database we used in the last tutorial over to your **act5** directory. The text file with time, location, and magntidues of these earthquakes is found at /home/jovyan/iris_data/SSBWFiles/EHB.64-04.eq.

Assuming you are located in the act5 directory already, which of the following would successfully perform this copy? (choose all that would work, but you only need to execute one on the command line)

Select one or more:

- a. copy EHB.64-04.eq ~/groupwork/act5/.
- b. cp /home/jovyan/iris_data/SSBWFiles/EHB.64-04.eq . ✓ 1 of 2 correct answers
- c. cp EHB.64-04.eq act5
- d. cp /home/jovyan/iris_data/SSBWFiles/EHB.64-04.eq ~/groupwork/act5/. ✓ 1 of 2 correct answers
- e. copy EHB.64-04.eq .
- f. copy /home/jovyan/iris_data/SSBWFiles/EHB.64-04.eq act5

Check

The correct answer is: cp /home/jovyan/iris_data/SSBWFiles/EHB.64-04.eq ., cp /home/jovyan/iris_data/SSBWFiles/EHB.64-04.eq ~/groupwork/act5/.

Correct

Marks for this submission: 1.00/1.00.

**Question 5**

Correct

1.00 points out of 1.00

Flag question

First, you should take another look at the information and structure of the **EHB.64-04.eq** file. Which of the following commands could be used to view the contents of this text file?

Select one or more:

- a. gedit ✓ 1 of 3 correct answers
- b. cat ✓ 1 of 3 correct answers
- c. more ✓ 1 of 3 correct answers
- d. gv
- e. ls

Check

The correct answer is: gedit, cat, more

Correct

Marks for this submission: 1.00/1.00.

**Question 6**

Correct

1.00 points out of 1.00

Flag question

Since it would take the computers in our classroom a while to display over 100,000 earthquakes when we plot them, we should limit the earthquakes in our file to only those after 1997 and store them in a file named **EHB.98-04.eq** for use on this assignment. Which `awk` command would accomplish this? If you are having trouble deciding how to write this command, you may want to review the previous assignment since we did this then also.

Answer: awk '$1>1997' EHB.64-04.eq >! EHB.98-04.eq ✓

Check

The correct answer is: awk '$1>1997' EHB.64-04.eq >! EHB.98-04.eq

Correct

Marks for this submission: 1.00/1.00.

**Question 7**

Correct

1.00 points out of 1.00

Flag question

The next step will be to extract the correct values we will need to plot the earthquakes on a map. In the last activity we wanted the depth and magnitude, so we printed columns 9 and 13 with `awk`. In this activity, we want `awk` to print the longitude and latitude to be able to plot the earthquakes on a map. So we should create a new file called **eq-loc.xy** that stores the longitude and latitude columns of the **EHB.98-04.eq** file and skips the first line header information. Which command would accomplish this?

Select one:

- a. awk 'NR>1{print $7,$8}' EHB.98-04.eq >! eq.xy
- b. awk '{print $9,$13}' EHB.98-04.eq >! eq.xy
- c. awk 'NR>1{print $8,$7}' EHB.98-04.eq >! eq-loc.xy ✓
- d. awk '{print $7,$8}' EHB.98-04.eq >! eq.xy
- e. awk '{print $8,$7}' EHB.98-04.eq >! eq-loc.xy
- f. awk 'NR>1{print $9,$13}' EHB.98-04.eq >! eq-loc.xy

Check

The correct answer is: awk 'NR>1{print $8,$7}' EHB.98-04.eq >! eq-loc.xy

Correct

Marks for this submission: 1.00/1.00.

**Question 8**

Correct

1.00 points out of 1.00

Flag question

Now we can start determining the **GMT** options we need to make our map. If we want a map of the earthquakes over a nearly global region, we need to select the range of longitude and latitude values that will represent that region, something like -180 to 180 longitude and -70 to 70 latitude.
What would be the correct option to specify this geographic region?

Select one:

- a. -G-70/70/-180/180
- b. -G-180/180/-70/70
- c. -R-180/-70/180/70
- d. -R-70/70/-180/180
- e. -G-180/-70/180/70
- f. -R-180/180/-70/70 ✓

Check

The correct answer is: -R-180/180/-70/70

Correct

Marks for this submission: 1.00/1.00.

**Question 9**

Correct

1.00 points out of 1.00

Flag question

Why should we not use a latitude range that goes all the way from -90 to 90?

Select one:

- a. The magnetic field distorts data near polar latitudes, so we only plot data from -70 to 70.
- b. Since the Earth is not flat, the Mercator projection does a poor job of plotting areas near the poles and plots them much larger than they actually are. ✓
- c. There are no earthquakes in the polar regions, so we only plot from -70 to 70.
- d. Since the Earth is not flat, the Mercator projection does a poor job of plotting areas near the poles and plots them much smaller than they actually are.

Check

Your answer is correct.

The correct answer is: Since the Earth is not flat, the Mercator projection does a poor job of plotting areas near the poles and plots them much larger than they actually are.

Correct

Marks for this submission: 1.00/1.00.

**Question 10**

Correct

1.00 points out of 1.00

Flag question

Since we do not want too many tick marks on this map, we should specify a relatively large tick interval like every 30 degrees on the longitude and latitude axes.
What would be the correct option to specify this?

Select one:

- a. -B.30/.30
- b. -B30/30 ✓
- c. -B30.30
- d. -T30/30
- e. -T30.30
- f. -T.30/.30

Check

The correct answer is: -B30/30

Correct

Marks for this submission: 1.00/1.00.

**Question 11**

Correct

1.00 points out of 1.00

Flag question

Since there will be many earthquakes on our map, we should make the symbols pretty small with the -S option. Which of the following would be the correct option specification for a .01 inch circle for each earthquake?

Select one:

- a. -S0.1c
- b. -S1.0/C
- c. -Sc.01 ✓
- d. -SC/0.1
- e. -SC.01
- f. -S1.0c

Check

The correct answer is: -Sc.01

Correct

Marks for this submission: 1.00/1.00.

**Question 12**

Correct

1.00 points out of 1.00

Flag question

Which of the following is the correct complete command that you can run to generate a map of the earthquake locations?

Select one:

- a. gmt psxy eq-loc.xy -JM6 -R-180/180/-70/70 -Sc.01 -B30/30 | map.ps
- b. gmt psxy eq-loc.xy -JM6 -R-180/180/-70/70 -Sc.01 -B30/30 <! map.ps
- c. gmt psxy eq.xy -JM6 -R-180/180/-70/70 -Sc.01 -B30/30 >! map.ps
- d. gmt psxy eq-loc.xy -JM6 -R-180/180/-70/70 -Sc.01 -B30/30 >! map.ps ✓
- e. gmt psxy eq.xy -JM6 -R-180/180/-70/70 -Sc.01 -B30/30 >! map.ps
- f. gmt psxy eq.xy -JM6 -R-180/180/-70/70 -Sc.01 -B30/30 | map.ps

Check

The correct answer is: gmt psxy eq-loc.xy -JM6 -R-180/180/-70/70 -Sc.01 -B30/30 >! map.ps

Correct

Marks for this submission: 1.00/1.00.

**Question 13**

Correct

1.00 points out of 1.00

Flag question

Now you should look at the map you created. Which command would be the best one to view the output of the psxy command?

Select one:

- a. gedit map.ps &
- b. gedit eq-loc.xy !
- c. gv map.ps & ✓
- d. gv eq-loc.xy
- e. gedit eq-loc.xy
- f. gv map.ps !

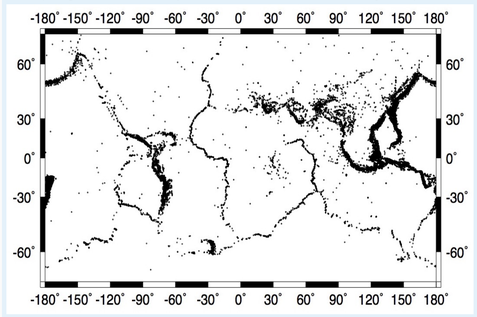
Check

The correct answer is: gv map.ps &

Correct
Marks for this submission: 1.00/1.00.

**Question 14**
Correct
1.00 points out of 1.00
Flag question

The map image should have a lot of points on it, with some linear trends. Does your map show the same patterns as this image?




Select one:
- a. Yes ✓
- b. No

Check

The correct answer is: Yes

Correct
Marks for this submission: 1.00/1.00.

**Question 15**
Correct
1.00 points out of 1.00
Flag question

## 2. Plotting Coastlines in GMT

You may be able to see the pattern in relation to the continents, but it would certainly help if the coastlines were shown in some way. Well it turns out that coastlines can be plotted with GMT too.

The pscoast command can be used to shade land and water areas on a map. The format for this command is similar to psxy

```
gmt pscoast options >! psfile
```

We will need to specify -J and -R options like we do for `psxy`, in addition to a few other options we will cover in the next question. Before we focus on that, what are the correct –J and –R options to create the same type of map as we did with `psxy`?

Select one:
- a. -JM5 -R-180/-70/180/70
- b. -JM6 -R-70/70/-180/180
- c. -JX5 -R-180/180/-70/70
- d. -JX5 -R-70/70/-180/180
- e. -JX6 -R-180/-70/180/70
- f. -JM6 -R-180/180/-70/70 ✓

Check

The correct answer is: -JM6 -R-180/180/-70/70

Correct
Marks for this submission: 1.00/1.00.

**Question 16**
Correct
1.00 points out of 1.00
Flag question

The `pscoast` command does not require the -B or -S options we used with `psxy`, but we will need to specify options that describe how to plot the land areas. There are two key options needed for this:

```
-D(resolution of coastline: h=high, i=intermediate, l=low)
-G(shading information for the land areas: gray scale numbers from 0=black to 255=white)
```

If we want low resolution coastlines plotted with a light gray shading, which of the following would be the correct options?

Select one:
- a. -Dl -G200 ✓ Correct. Make note of this because we will use it in the next question.
- b. -Dlow -G200
- c. -DL -G200
- d. -DL -G20
- e. -Dl -G20
- f. -Dlow -G20

Check

The correct answer is: -Dl -G200

Correct
Marks for this submission: 1.00/1.00.

**Question 17**
Correct
1.00 points out of 1.00
Flag question

Which of the following would be the correct command to produce a plot named **coast.ps** using the options described above?

Select one:
- a. gmt pscoast -JM6 -R-180/180/-70/70 -Dl -G200 -B30/30 >! coast.ps ✓ Correct. Please make sure you run this command at the command line to create the coast.ps file.
- b. gmt psxy -JM6 -R-180/180/-70/70 -Dl -G200 -B30/30 > coast.ps
- c. gmt pscoast -JM6 -R-180/180/-70/70 -D200 -Gl -B30/30 >! coast.ps
- d. gmt psxy -JM6 -R-180/180/-70/70 -D200 -Gl -B30/30 | coast.ps
- e. gmt pscoast -JM6 -R-180/180/-70/70 -D200 -Gl -B30/30 > map.ps
- f. gmt psxy -JM6 -R-180/180/-70/70 -Dl -G200 -B30/30 | map.ps

Check

The correct answer is: gmt pscoast -JM6 -R-180/180/-70/70 -Dl -G200 -B30/30 >! coast.ps

Correct
Marks for this submission: 1.00/1.00.

**Question 18**
Correct
1.00 points out of 1.00
Flag question

Now you should look at the map you created. What would be the best thing to type on the command line to view the map you created in the previous question?

Answer: gv coast.ps & ✓

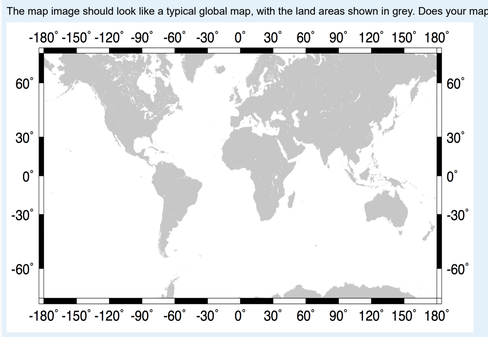
Check

The correct answer is: gv coast.ps &

Correct
Marks for this submission: 1.00/1.00.

**Question 19**
Correct
1.00 points out of 1.00
Flag question

The map image should look like a typical global map, with the land areas shown in grey. Does your map show the same patterns as this image?




Select one:
- a. No
- b. Yes ✓

Check

The correct answer is: Yes

Correct
Marks for this submission: 1.00/1.00.

**Question 20**
Correct
1.00 points out of 1.00
Flag question

Since we want both the earthquakes and coastlines to appear on the same map we will need to have the psxy and pscoast commands send their output to the same file that we will name **map-coast.ps**. **GMT** needs to know that you will be doing this so it can format the output correctly. The way to tell **GMT** about this is with the `-K` and `-O` options. `-K` means that more commands will add to the output file (I remember this by saying "more output is Koming" - it helps if you say this with a German accent), and `-O` means that the output of the command should be Overlayed on top of the previous output.

Over the next few questions, we will set up a pair of commands to make our plot. The first command will set up the shaded land areas, while the second command will plot the earthquakes. Given that we want the earthquakes to appear on top of the shaded land areas, what should we have in our first command?

*Note: If you are struggling with remembering the difference between **>!** and **>>**, look back to Module 1 Tutorial 2 Question 4 for **>>** and Module 1 Tutorial 3 Question 20 for **>!***

Select one:
- a. gmt pscoast with a –K option and >! map-coast.ps at the end ✓ Correct! Since it is the first command, the >! symbol should be used to create a new file. Then the –K option should be used in the first command to indicate more output is Koming.
- b. gmt pscoast with a –O option and >! map-coast.ps at the end
- c. gmt psxy with a –K option and >! map-coast.ps at the end
- d. gmt pscoast with a –K option and >> map-coast.ps at the end
- e. gmt psxy with a –K option and >> map-coast.ps at the end
- f. gmt pscoast with a –O option and >> map-coast.ps at the end
- g. gmt psxy with a –O option and >! map-coast.ps at the end
- h. gmt psxy with a –O option and >> map-coast.ps at the end

Check

The correct answer is: gmt pscoast with a –K option and >! map-coast.ps at the end

Correct
Marks for this submission: 1.00/1.00.

**Question 21**
Correct
1.00 points out of 1.00
Flag question

Which of the following would be the correct pair of commands to run on the command line to combine the coastlines and earthquakes into one plot?

Select one:
- a. gmt psxy eq-loc.xy -JM6 -R-180/180/-70/70 -Sc.01 -B30/30 -O >> map.ps
  gmt pscoast -JM6 -R-180/180/-70/70 -Dl -G200 -B30/30 -K >! map-coast.ps
- b. gmt psxy eq-loc.xy -JM6 -R-180/180/-70/70 -Sc.01 -B30/30 -O >> map-coast.ps
  gmt pscoast -JM6 -R-180/180/-70/70 -Dl -G200 -B30/30 -K >! map-coast.ps
- c. gmt pscoast -JM6 -R-180/180/-70/70 -Dl -G200 -B30/30 -K >> map-coast.ps
  gmt psxy eq-loc.xy -JM6 -R-180/180/-70/70 -Sc.01 -B30/30 -O >! map.ps
- d. gmt pscoast -JM6 -R-180/180/-70/70 -Dl -G200 -B30/30 -K >> map-coast.ps
  gmt psxy eq-loc.xy -JM6 -R-180/180/-70/70 -Sc.01 -B30/30 -O >! map-coast.ps
- e. gmt pscoast -JM6 -R-180/180/-70/70 -Dl -G200 -B30/30 -K >! map-coast.ps
  gmt psxy eq-loc.xy -JM6 -R-180/180/-70/70 -Sc.01 -B30/30 -O >> map-coast.ps ✓ Correct. Make sure you run these two commands
- f. gmt pscoast -JM6 -R-180/180/-70/70 -Dl -G200 -B30/30 -K >! map-coast.ps
  gmt psxy eq-loc.xy -JM6 -R-180/180/-70/70 -Sc.01 -B30/30 -O >> map.ps

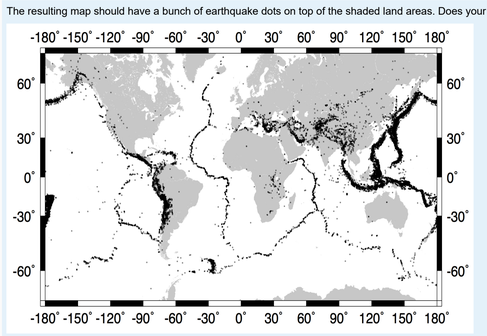
Check

The correct answer is: gmt pscoast -JM6 -R-180/180/-70/70 -Dl -G200 -B30/30 -K >! map-coast.ps
gmt psxy eq-loc.xy -JM6 -R-180/180/-70/70 -Sc.01 -B30/30 -O >> map-coast.ps

Correct
Marks for this submission: 1.00/1.00.

**Question 22**
Correct
1.00 points out of 1.00
Flag question

The resulting map should have a bunch of earthquake dots on top of the shaded land areas. Does your map look like this?




Select one:
- a. Yes ✓
- b. No

Check

The correct answer is: Yes

Correct
Marks for this submission: 1.00/1.00.

**Question 23**
Correct
1.00 points out of 1.00

Think about the patterns you see in the earthquakes relative to the coastlines. What does the distribution of earthquakes show, particularly where there are areas of dense seismicity. How do they relate to the land areas. Is there some other piece of information besides the coastlines that would better correlate with the earthquakes? Decide which of the following statements match your observations. Check all that apply.

Select one or more:
- a. The earthquakes better correlate edges of land areas (continents) than with plate boundaries.

Flag question

- b. Earthquakes occur ONLY along the edges of land areas (continents)
- c. There are many cases where the earthquakes occur along the edges of land areas (continents), but not all. ✓ 1 of 3 correct
- d. The earthquakes better correlate with plate boundaries than edges of land areas (continents). ✓ 1 of 3 correct
- e. The earthquakes only correlate with some types of plate boundaries.
- f. Earthquakes occur over most of the world, but tend to be concentrated in fault zones. ✓ 1 of 3 correct
- g. Earthquakes occur over most of the world, but they are NOT concentrated in any areas.
- h. Earthquakes DO NOT occur along the edges of land areas (continents)

Check

Your answer is correct.

The correct answer is: Earthquakes occur over most of the world, but tend to be concentrated in fault zones., There are many cases where the earthquakes occur along the edges of land areas (continents), but not all., The earthquakes better correlate with plate boundaries than edges of land areas (continents).

Correct

Marks for this submission: 1.00/1.00.

Finish review