

## RUSTIN INVITATIONAL 2018 \*KEY\*

Team # \_\_\_\_\_

School: \_\_\_\_\_

Name: \_\_\_\_\_

Name: \_\_\_\_\_

### ANSWER SHEET

#### Part 1

1. \_\_B\_\_
2. \_\_H\_\_
3. \_\_B,F\_\_
4. \_\_F,C,H,B\_\_
5. \_\_F,C,H,B\_\_
6. \_\_C,H,F,B\_\_
7. \_\_D\_\_
8. \_\_H\_\_
9. \_\_E\_\_
10. \_\_H\_\_
11. \_\_A\_\_
12. \_\_C\_\_

#### Part 2

13. \_\_Floor\_\_
14. \_\_Central Peaks\_\_
15. \_\_Walls\_\_
16. \_\_Rim\_\_
17. \_\_Ejecta\_\_
18. \_\_Rays\_\_

#### Part 3

19. \_\_Mars Pioneer\_\_

20. \_\_about 59%\_\_
21. \_\_lunar libration\_\_
22. \_\_Titius-Bode Law or Bode's Law\_\_
23. \_\_Ceres\_\_
24. \_\_melted rock and gases\_\_
25. \_\_the terminator\_\_
26. \_\_maria\_\_
27. \_\_secondary crater\_\_
28. \_\_tidal coupling\_\_
29. \_\_transit\_\_
30. \_\_Mercury, Venus\_\_
31. \_\_Viking 2\_\_
32. \_\_Fortunian Period\_\_
33. \_\_nonspherical\_\_
34. \_\_not large enough to have enough gravity to create spherical moons\_\_
35. \_\_Tycho Brahe\_\_
36. \_\_It moved in epicycles or tiny circles in its orbit\_\_
37. \_\_Isaac Newton\_\_
38. \_\_2<sup>nd</sup> or Law of Areas\_\_
39. \_\_Galileo Galilei\_\_
40. \_\_42 hours or 42.456 hours\_\_
41. \_\_42 hours or 42.456 hours\_\_
42. \_\_Io plasma torus\_\_
43. \_\_regolith\_\_
44. \_\_very small iron cores or they are frozen, not convecting\_\_
45. \_\_Junev\_\_
46. \_\_Mercury\_\_
47. \_\_C\_\_

48. \_\_ liquid rock, it can convect \_\_\_\_\_  
49. \_\_ New Moon \_\_\_\_\_  
50. \_\_ Umbra \_\_\_\_\_  
51. \_\_ Moons orbit is tilted 5 degrees from  
Earth's orbit \_\_\_\_\_  
52. \_\_ Annular \_\_\_\_\_

#### Part 4

53. \_\_ Caloris Basin \_\_\_\_\_  
54. \_\_ Formation of Solar System or 4.6  
billions years ago  
55. \_ Mariner 10 \_\_\_\_\_  
56. \_ Mars \_\_\_\_\_  
57. \_ Hellas Planitia \_\_\_\_\_  
58. \_ Lakshimi Planum \_\_\_\_\_

59. \_ Pele Volcano / Io \_\_\_\_\_  
60. \_ Sulfur or Sulfur Dioxide \_\_\_\_\_  
61. \_ Berringer Crater \_\_\_\_\_  
62. \_\_\_\_ Earth \_\_\_\_\_  
63. \_\_\_\_ Tycho Crater \_\_\_\_\_  
64. \_\_\_\_ Moon \_\_\_\_\_  
65. \_\_\_\_ 108 Million years old \_\_\_\_\_  
66. \_ defined jagged features, not smooth,  
brightness \_\_\_\_  
67. \_ Sea of Rains or Mare Imbrium \_\_\_\_\_  
68. \_ Apollo 15 \_\_\_\_\_  
69. \_ On Venus, Pillan Patera erupted and  
covered the ring around Pele. In the last  
image a small volcano erupted to the  
right of Pillan \_\_\_\_\_

**70. Period of Saturn = 29.46 years**

**71. Distance of Satellite = 6.614 Earth Radii**

**72. Distance of Dwarf Planet = 72.66 AU**

73. Total Mass: \_\_\_\_ **3 Solar Masses** \_\_\_\_\_

Mass of Star X: \_\_\_\_ **.5 Solar Masses** \_\_\_\_\_

Mass of Star Y: \_\_\_\_ **2.5 Solar Masses** \_\_\_\_\_

74. \_\_ Northern Hemisphere of Mars In non-volcanic low flatlands. Southern Hemisphere of Mars is  
highlands with many volcanoes \_\_\_\_\_

75. Diagram should show the Moon **between** the Earth and Sun

## WORKSHEET

70.  $d^3/P^2 \text{ Earth} = d^3/P^2 \text{ Saturn}$   
 $(149.6 \times 10^6 \text{ km})^3 / 1 \text{ yr}^2 \text{ Earth} = (1427 \times 10^6 \text{ km})^3 / P^2 \text{ Saturn}$   
**Period of Saturn = 29.46 years**
71.  $d^3/P^2 \text{ Moon} = d^3/P^2 \text{ Satellite}$   
 $60 \text{ ER}^3 / 27.3217 \text{ days}^2 \text{ Moon} = d^3 / 1 \text{ day}^2 \text{ Satellite}$   
**Distance of Satellite = 6.614 Earth Radii**
72.  $d^3/P^2 \text{ Earth} = d^3/P^2 \text{ dwarf Planet}$   
 $1 \text{ AU}^3 / 1 \text{ year}^2 \text{ Earth} = d^3 / 619.36 \text{ years}^2 \text{ dwarf Planet}$   
**Distance of Dwarf Planet = 72.66 AU**
73.  $M_x + M_y = 12 \text{ AU}^3 / 24 \text{ years}^2 = 3 \text{ Solar Masses}$   
 $M_x / M_y = 2 \text{ AU} / 10 \text{ AU} \quad M_x = 1/5 M_y$   
 $1/5 M_y + M_y = 3 \text{ Solar Masses}$   
 **$M_y = 2.5 \text{ Solar Masses}$**   
 **$M_x = .5 \text{ Solar Masses}$**