Section A (60 points)

1. __C__   2. __D__   3. __A__   4. __AD__   5. __D__

6. __B__   7. __A__   8. __E__   9. __A__   10. __A__

11. __C__   12. __B__   13. __C__   14. __C__   15. __F__

16. __C__   17. __C__   18. __D__   19. __D__   20. __B__

21. __C__   22. __B__   23. __A__   24. __C__   25. __A__

26. __C__   27. __B__   28. __B__   29. __B__   30. __D__

Section B (90 points)

1. (a) <u>77 000</u> J

   (b) <u>Efficiency is 45.5 %. Since efficiency is less than 50 %, the inclined plane is self-locking.</u>

   (c) <u>0.0204</u>

   (d) <u>7.22</u> s

   (e) <u>27.2</u> m s^{-1}

2. (a) <u>34.4</u>

   (b) i. <u>$a = 8.42 \times 10^5$</u>

        <u>$b = -1$</u>

        ii. <u>5.61×10^{-2}</u> m

        iii. <u>Answers vary. An acceptable answer is friction (from the pulleys, the rails, the drill bit and ore) and which can be remedied with lubricant (liquid [water, oil] or solid [graphite]).</u>

   (c) i. <u>1.45</u> m s^{-1}

        ii. <u>189</u> J

        iii. <u>1450</u> N

        iv. <u>Answers vary.</u>

3. <u>Rubric outlined in Solutions file.</u>

4. (a) <u>13.1</u>

   (b) <u>67.1</u> N m

   (c) <u>28.4</u> L s^{-1}

   (d) i. <u>1.49, 2.82 if 127 N m was used.</u>

        ii. <u>Variable scoring dependent on percent error, outlined in Solutions file.</u>