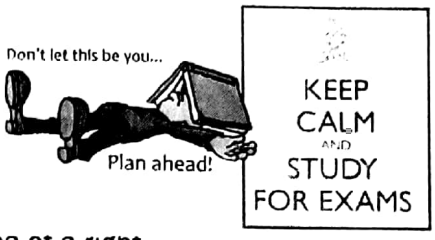
Mathematics 10
Exam Prep

Measurement Unit



1. Which expression would you use to calculate the lateral area of a right cone?

(A) $\pi r^2 + \pi rs$ (B) πdh (C) $\frac{1}{3}\pi r^2 h$ (D) πrs

2. If a soccer ball has a diameter of 22 cm, how many cubic centimetres of air would be required to fully inflate the soccer ball?

$V = \frac{4}{3}\pi(11)^3$

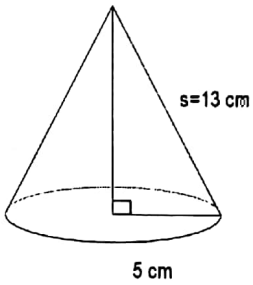
$= 5575.2798$

(A) 138
(B) 276
(C) 5572
(D) 44602

3. Find, to the nearest square centimetre, the surface area of the figure (including the base).

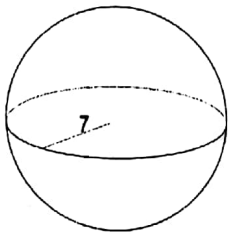
$SA = \pi(5)^2 + \pi(5)(13)$

$= 282.7433$



(A) 263 cm²
(B) 273 cm²
(C) 283 cm²
(D) 293 cm²

4. To the nearest tenth of a cubic centimetre, what is the volume of the sphere if r = 7 in.?

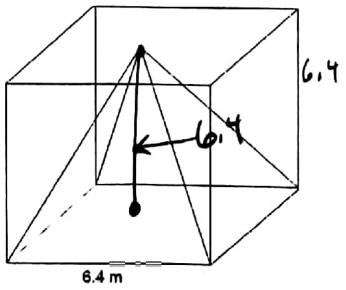


$V = \frac{4}{3}\pi(7)^3$

$= 1438.8$

(A) 205.3 in³
(B) 615.8 in³
(C) 1436.8 in³
(D) 2212.4 in³

5. What is the volume of the pyramid that just fits inside the cube with side length 6.4m?



$V = \frac{1}{3}(l \cdot w)h$

$= \frac{1}{3}(6.4 \cdot 6.4)6.4$

$= 87.38$

(A) 13.65m³
(B) 87.38m³
(C) 262.14m³
(D) 785.43m³

$V = \frac{1}{3}\pi r^2 h$ same $V = \pi r^2 h$

so V of cone is $\frac{1}{3}$ of the volume of cylinder b/c radius and height are the same

6. A cone and a cylinder have the same height and the same base radius. If volume of the cylinder is 81 cm³, what is the volume of the cone in cm³?

(A) 9 (B) 27 (C) 78 (D) 243

7. A cone has a volume of 30 cm³ and a base of 15 cm². What is the height of the cone?

$V = \frac{1}{3}\pi r^2 h$

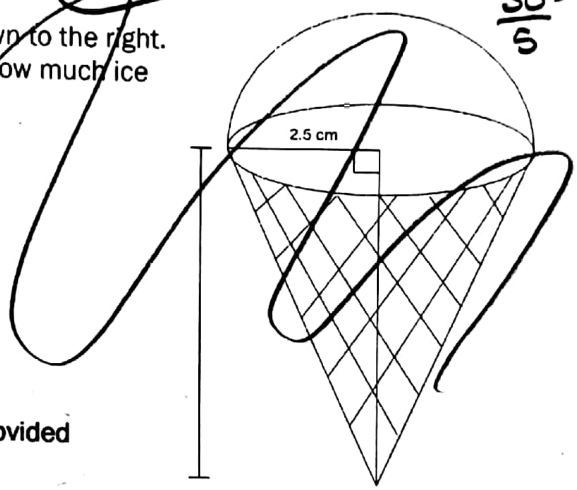
$30 = \frac{1}{3}(15)h$

$\frac{30}{5} = \frac{5h}{5}$ $h = 6$

(A) 2 cm (B) 4 cm (C) 6 cm

8. A picture of an ice cream cone is shown to the right. If the ice cream fills the entire cone, how much ice cream is there?

(A) 81.8cm³
(B) 88.36cm³
(C) 114.5cm³
(D) 127.6cm³



Part B: Answer the questions in the space provided

1. Give your answers to the nearest unit.

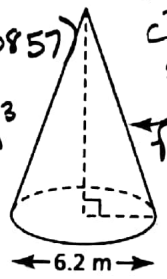
a) Find the Volume

$a^2 + b^2 = c^2$

$c^2 - a^2 = b^2$

$\sqrt{9.6^2 - (3.1)^2} = b$

$9.0857 = b$

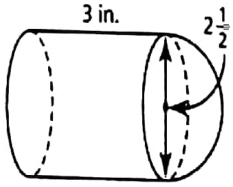


$V = \frac{1}{3}\pi(3.1)^2(9.0857)$

$= 91.4346 m^3$

$= 92 m^3$

b) Find the Surface Area



$SA = \pi r^2 + 2\pi rh + \frac{1}{2}(4\pi r^2)$

$= \pi(1.25)^2 + 2\pi(1.25)(3) + 2\pi(3.1)^2$

$= 114.1341 in^2$

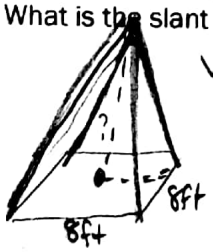
$= 114 in^2$

2. A right prism and a right pyramid have the same base and the same height. Explain how their volumes are related. pyramid is $\frac{1}{3}$ the volume of prism

3. The surface area of a sphere is 137.5 cm². What is the radius of the sphere to the nearest tenth of a centimetre?

$SA = 4\pi r^2$ $\frac{137.5}{4\pi} = r^2$ $\sqrt{\frac{137.5}{4\pi}} = r$ $r = 3.3 cm$

4. The volume of a right square pyramid is 126 cubic feet. The side length of the base is 8 ft.
   a) Sketch the pyramid.
   b) Determine the height of the pyramid to the nearest foot.
   c) What is the slant height of the pyramid to the nearest foot?



$V = 126 ft^3$ $V = \frac{1}{3}lwh$

(b) $126 = \frac{1}{3}(8 \cdot 8 \cdot h)$

$\frac{126}{21.\overline{3}} = \frac{21.\overline{3}h}{21.\overline{3}}$

$5.9 ft = h$ $h = 6 ft$

(c) $a^2 + b^2 = c^2$

$4^2 + 5.9063^2 = c^2$

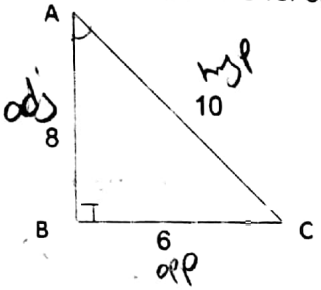
$\sqrt{4^2 + 5.9063^2} = c$

$7.1333 ft = c$

slant height = 7ft

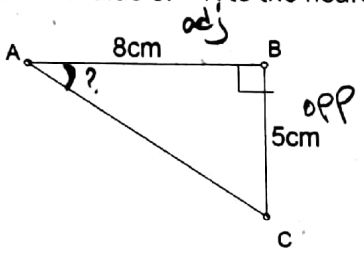
Trigonometry Unit

1. Write the RATIO for sin <A, cos < A and tan <A.



$\sin A = \frac{6}{10} = \frac{3}{5}$ $\cos A = \frac{8}{10} = \frac{4}{5}$ $\tan A = \frac{6}{8} = \frac{3}{4}$

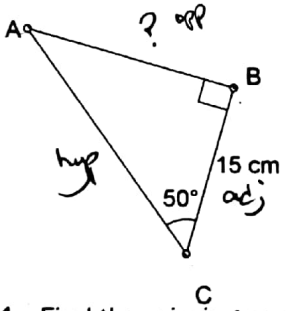
2. Find the value of < A to the nearest degree.



$\tan A = \frac{5}{8}$

$A = \tan^{-1}\left(\frac{5}{8}\right)$ $A = 32°$

3. Find the length of side AB to the nearest tenth of a centimetre.

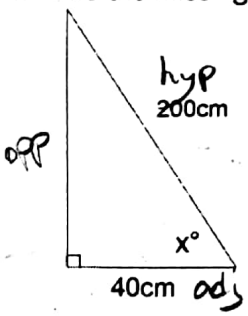


$\tan 50° = \frac{opp}{15}$, 15

$15 \tan 50° = opp$

$17.9\text{cm} = opp$

4. Find the missing angle to the nearest degree.

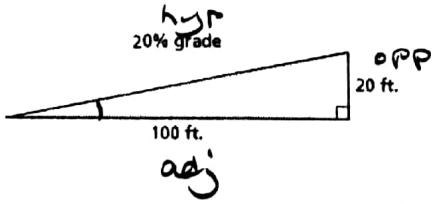


$\cos x = \frac{adj}{hyp}$

$\cos X = \frac{40}{200}$

$x = \cos^{-1}\left(\frac{40}{200}\right)$ $X = 78°$

5. When a road has a grade of 20% it increases 20 ft in altitude for every 100 ft of horizontal distance. Calculate the angle of inclination, to the nearest degree , of a road with a grade of 20%.

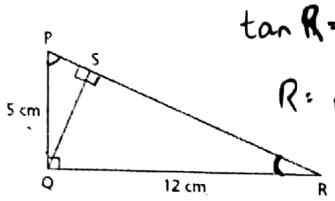


$\tan\theta = \frac{20}{100}$

$\theta = \tan^{-1}\left(\frac{20}{100}\right)$

$\theta = 11°$

6. Determine the measures of all the acute angles in the diagram to the nearest degree.



$\tan R = \frac{5}{12}$

$R = \tan^{-1}\left(\frac{5}{12}\right)$

$= 22.6199°$

$= 23°$

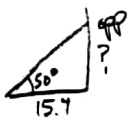
$\angle P = 180° - 90° - 22.6199°$

$= 67.3801°$

$= 67°$

$\angle PQS = 23°$ $\angle SQR = 67°$

7. A guy wire helps to support a tower. The angle between the wire and the ground is 50°. One end of the wire is 15.4m from the base of the tower. How high up the tower does the wire reach to the nearest tenth of a metre? → 18.4 m



$\tan 50 = \frac{opp}{15.4}$ · 15.4

$16.4 \tan 50° = opp$

8. In ΔPQR, $\angle R = 90°$, $\angle P = 58°$ and PR = 7.1 cm. Determine the area of the triangle to the nearest tenth of a centimetre.

$\tan 58° = \frac{opp}{7.1}$

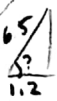
$7.1 \tan 58° = opp$

$11.3624\text{cm} = opp$

$A = \frac{bh}{2} = \frac{(7.1)(11.3624)}{2}$

$= 40.3\text{cm}$

9. A ladder 6.5m long is resting on a building. The base of the ladder is 1.2m from the wall. What is the angle of inclination of the ladder to the nearest degree?

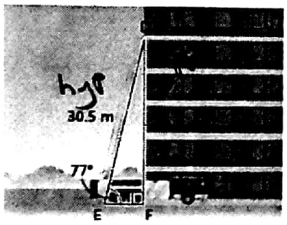


$\cos\theta = \frac{1.2}{6.5}$

$\theta = \cos^{-1}\left(\frac{1.2}{6.5}\right)$

$\theta = 79°$

10. A fire truck has an aerial ladder that extends 30.5m measured from the ground. The angle of inclination of the ladder is 77°. How far up the wall of an apartment building can the ladder reach?



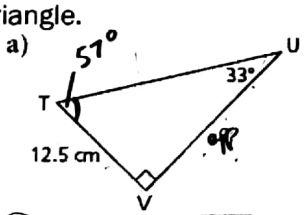
$\sin 77° = \frac{opp}{30.5}$ · 30.5

$30.5 \sin 77° = opp$

$29.7183\text{m} = \text{height}$

11. Solve each triangle.

a)



$\tan 57° = \frac{opp}{12.5}$

$12.5 \tan 57° = opp$

$19.2483\text{cm} = opp$

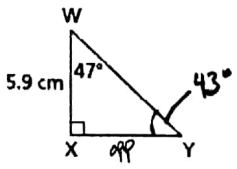
$a^2 + b^2 = c^2$

$12.5^2 + 19.2483^2 = c^2$

$\sqrt{12.5^2 + 19.2483^2} = c$

$22.9510\text{cm} = hyp$

b)



$\tan 47° = \frac{opp}{5.9}$

$5.9 \tan 47° = opp$

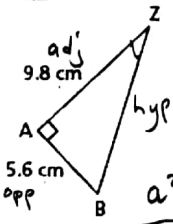
$6.327\text{cm} = XY$

$5.9^2 + 6.327^2 = WY^2$

$\sqrt{5.9^2 + 6.327^2} = WY$

$8.6511\text{cm} = WY$

c)



$a^2 + b^2 = c^2$

$\sqrt{5.6^2 + 9.8^2} = c$

$11.2872\text{cm} = c$

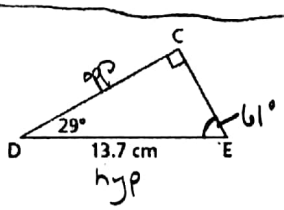
$\tan Z = \frac{5.6}{9.8}$ $Z = \tan^{-1}\left(\frac{5.6}{9.8}\right)$

$Z = 29.7449°$

$\angle B = 180° - 90° - 29.7449°$

$= 60.2551°$

d)



$\sin 61° = \frac{opp}{13.7}$

$13.7 \sin 61° = opp$

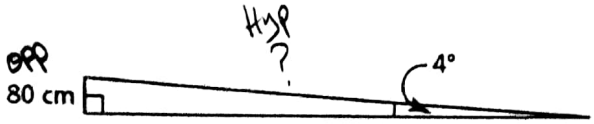
$11.9823\text{cm} = \overline{DC}$

$c^2 - b^2 = a^2$

$\sqrt{13.7^2 - 11.9823^2} = \overline{CE}$

$6.6419 = \overline{CE}$

12. An architect draws this diagram of a wheelchair ramp for a building. Determine the length of the ramp.



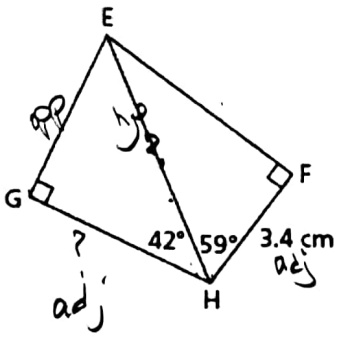
$\sin 4° = \frac{80}{hyp}$ · hyp

$\frac{hyp \sin 4°}{\sin 4°} = \frac{8}{\sin 4°}$

hyp = 114.6847cm

13. Calculate the length of GH to the nearest tenth of a centimetre.

b)



$\cos 59° = \frac{3.4}{hyp}$

$\frac{hyp \cos 59°}{\cos 59°} = \frac{3.4}{\cos 59°}$

hyp = 6.6015 cm

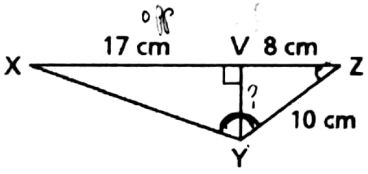
$\cos 42° = \frac{adj}{6.6015}$ · 6.6015

$6.6015 \cos 42° = adj$

4.9cm = $\overline{GH}$

14. Calculate the measure of <XYZ to the nearest degree.

b)



$\sqrt{16^2 - 8^2} = ?$

$6 = ?$

$\tan Z = \frac{6}{8}$

$Z = \tan^{-1}(\frac{6}{8})$

Z = 36.8699°

∠VYZ = 53.1301

∠XYV → $\tan Y = \frac{17}{6}$

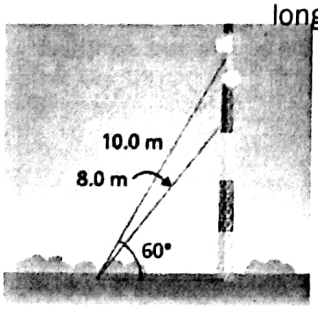
$Y = \tan^{-1}(\frac{17}{6})$

= 70.5600°

∠XYZ = 53.1301° + 70.56

= 124°

15. A communications tower has many guy wires to support it. Two of these guy wires are 8.0m and 10.0m long. They are attached to the same point on the ground. The longer wire has an angle of inclination of 60°.



No Question...?

Roots & Powers

1. Which of these numbers is rational?

A) $\sqrt{48}$ B) $\sqrt{8.1}$ C) $\sqrt[3]{-16}$ D) $\sqrt{\frac{4}{169}}$

2. Which of these numbers is irrational?

A) -68 B) $\sqrt{48}$ C) $\sqrt[3]{216}$ D) $\sqrt{\frac{49}{16}}$

3. Determine which of these numbers is the least.

A) $\sqrt[4]{100} = 3.1623$ B) $\sqrt[3]{30} = 3.1072$ C) $\sqrt{14} = 3.7417$ D) $\sqrt[3]{75} = 4.2172$

4. Which of these numbers is a natural number?

A) 9 B) 0 C) $1.\overline{8}$ D) -1

5. What is the index of $\sqrt[3]{2^7}$?

A) 2^7 B) 3 C) 7 D) 2

6. What is the radicand of $\sqrt[6]{4^8}$?

A) 4 B) 4^8 C) 6 D) 8

7. Write $\sqrt{108}$ in simplest form. $\sqrt{4 \cdot 27} = \sqrt{2 \cdot 2 \cdot 3 \cdot 3 \cdot 3} = 2 \cdot 3\sqrt{3} = 6\sqrt{3}$

A) $3\sqrt{12}$ B) $6\sqrt{3}$ C) $36\sqrt{3}$ D) $3\sqrt{6}$

8. Write $3\sqrt[3]{4}$ as an entire radical. $= \sqrt[3]{3 \cdot 3 \cdot 3 \cdot 4}$

A) $\sqrt[3]{108}$ B) $\sqrt[3]{144}$ C) $\sqrt[3]{36}$ D) $\sqrt[3]{192}$

9. A square as an area of 12 square inches. What is the side length of the square as a radical in simplest form. $\sqrt{12} = \sqrt{4 \cdot 3} = 2\sqrt{3}$ in

A) $4\sqrt{3}$ in. B) $2\sqrt{6}$ in. C) $3\sqrt{2}$ in. D) $2\sqrt{3}$ in.

10. What is the value of $64^{\frac{1}{3}}$? $\sqrt[3]{64}$

A) 8 B) 4 C) -4 D) $21\frac{1}{3}$

11. What is $42^{\frac{5}{4}}$ as a radical? $\left(\sqrt[4]{42}\right)^5$

A) $\sqrt[5]{42^4}$ B) $\left(\sqrt[4]{42}\right)^5$ C) $\frac{5}{4}\sqrt{42}$ D) $\left(\sqrt[5]{42}\right)^4$

12. What is $\sqrt{\left(\frac{3}{4}\right)^9}$ as a power?

A) $\left(\frac{3}{4}\right)^{\frac{-9}{2}}$ B) $\left(\frac{3}{4}\right)^{\frac{9}{2}}$ C) $\left(\frac{4}{3}\right)^{\frac{-2}{9}}$ D) $\left(\frac{3}{4}\right)^{\frac{2}{9}}$

13. Write $2a^{-3}$ without a negative exponent. $\frac{2}{a^3}$

A) $\frac{1}{2a^3}$ B) $\frac{a^{-3}}{2}$ C) $\frac{2}{a^3}$ D) $\frac{2}{a^{-3}}$

14. $\left(\frac{3}{5}\right)^{-2}$ is equivalent to

A) $\frac{25}{9}$ B) $\frac{9}{25}$ C) $\frac{6}{10}$ D) $\frac{10}{6}$

15. Simplify $\frac{12p^3q^{-7}}{15pq^6}$. Write using powers with positive exponents.

A) $\frac{4p^3}{5q^{13}}$ B) $\frac{p^2}{3q^{13}}$ C) $\frac{4p^2}{5q}$ D) $\frac{4p^2}{5q^{13}}$

Section B:

1. Simplify the following:

A) $\frac{-12a^{-3}b^{-7}c^{-6}}{3a^{-6}b^{-3}c^{-3}} =$

$= -4a^3b^{-4}c^{-3}$

$= \frac{-4a^3}{b^4c^3}$

B) $\frac{(8x^{-3}y^{-2})^2}{(2xy^7)^5} = \frac{64x^{-6}y^{-4}}{32x^5y^{35}}$

$= 2x^{-11}y^{-39}$

$= \frac{2}{x^{11}y^{39}}$

C) $\left(x^{\frac{1}{2}}\right)^{\frac{1}{4}}(x^7)^{\frac{1}{8}}$

$\left(x^{1/8}\right)\left(x^{7/8}\right)$

$= x^{8/8} = x$

D) $\frac{(3x^3y)^0(x^{-2}y^3)^5}{(x^{-7}y)^3} = \frac{1 \cdot x^{-10}y^{15}}{x^{-21}y^3}$

$= x^{11}y^{12}$

E) $\sqrt[5]{p^3} \times \sqrt[3]{p}$

$p^{3/5} \cdot p^{1/3}$

$= p^{9/15} \cdot p^{5/15}$

$= p^{14/15}$

F) $m^{-6}n^3p^{-4} \times m^{-2}np^{-2}$

$m^{-8}n^4p^{-6}$

$= \frac{n^4}{m^8p^6}$

Factors & Products

Section One: Circle the correct solution.

1. For the expression $x^2 - \boxed{?}x - 12$ to be factorable, give the value for $\boxed{?}$.

   (A) 2 (B) 3 (C) 4 (D) 6

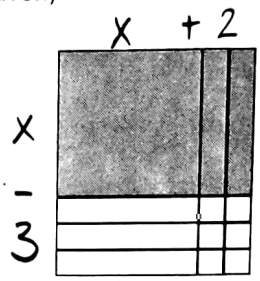
2. A polynomial is represented by the tiles shown below. What are the factors of the polynomial? (Consider the shaded tiles positive!)

   (A) $(x+3)(x-2)$

   (B) $(x+3)(x+2)$

   (C) $(x-3)(x-2)$

   (D) $(x-3)(x+2)$



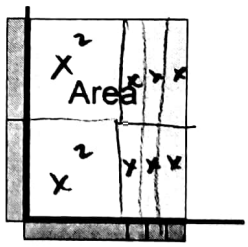
3. Two students set up some algebra tiles to help model a product. Which expression represents the modeled area?(Shaded tiles are positive)

   (A) $x^2 + 6x$

   (B) $2x^2 + 3x$

   (C) $x^2 + 3x$

   (D) $2x^2 + 6x$



4. Multiply: $(2x-3)(3x+4)$. $= 6x^2 + 8x - 9x - 12$

   (A) $6x^2 - x - 12$ (B) $6x^2 - 12$

   (C) $6x^2 - 17x - 12$ (D) $6x^2 + 2x - 12$

5. A rectangle has dimensions $(2x - 3)$ and $(3x + 1)$. Find the area of the rectangle.

   (A) $5x - 2$ (B) $6x^2 - 7x - 3$

   (C) $6x^2 + 7x - 3$ (D) $5x^2 - 7x - 3$

$(2x-3)(3x+1)$

$6x^2 + 2x - 9x - 3$

$= 6x^2 - 7x - 3$

6. Which is the product of $(x+3)$ and $(3x-2)$?

(A) $3x^2-6$ (B) $4x^2-6$

(C) $3x^2+7x-6$ (D) $4x^2+7x-6$

7. The area of a rectangle is $x^2-2x-24$. What are the dimensions? $(x-6)(x+4)$

(A) $(x+4)$ by $(x-6)$ (B) $(x-4)$ by $(x+6)$

(C) $(x+4)$ by $(x+6)$ (D) $(x-4)$ by $(x-6)$

8. Factor completely: $4x^2-25$ $(2x-5)(2x+5)$

(A) $(4x-25)(4x+25)$
(B) $(2x-5)(2x-5)$
(C) $(2x-5)(2x+5)$
(D) $(2x+5)(2x+5)$

9. Factor completely: $2x^2+4x-6$ $\rightarrow 2(x^2+2x-3)$ $= 2(x+3)(x-1)$

(A) $(x+3)(x-1)$
(B) $(2x-2)(x+3)$
(C) $2(x^2+2x-3)$
(D) $2(x-1)(x+3)$

10. Expand and simplify: $(x+2)(2x^2-x+5)$ $= 2x^3-x^2+5x+4x^2-2x+10$ $= 2x^3+3x^2+3x+10$

(A) $2x^3+3x^2+3x+10$
(B) $2x^3-x^2+5x+10$
(C) $2x^3+5x^2+7x+10$
(D) $2x^3+3x^2+7x+10$

Section Two: Answer all questions. You MUST show your work to get full credit.

1. Expand and simplify using the method of your choice.

(A) $(2x-1)(x+3)-(3x+2)(2x+5)$ $= 2x^2+6x-x-3-[6x^2+15x+4x+10)$ $= -4x^2-14x-13$

(B) $(x^2-2x+5)(2x^2+4x-1)$

$2x^4+4x^3-x^2-4x^3-8x^2+2x+10x^2+20x-5 \rightarrow 2x^4+x^2+22x-5$

2. Factor fully each of the following expressions:

(A) $x^2-5x-14$ $= (x-7)(x+2)$

(B) $8x^2+10x-3$ $b=10$ $ac=-24$ $+12$ -2 $8x^2-2x+12x-3$ $2x(4x-1)+3(4x-1)$ $(4x-1)(2x+3)$

(C) $6x^2-xy-2y^2$ $ac=-12$ $b=-1$ -4 3 $\rightarrow 6x^2+3xy-4xy-2y^2$ $= 3x(2x+y)-2y(2x+y)$ $= (2x+y)(3x-2y)$

(D) $81x^4-16y^4$ $= (9x^2+4y^2)(9x^2-4y^2)$ $= (9x^2+4y^2)(3x-2y)(3x+2y)$