**PADANG CITY GOVERNMENT**

**EDUCATION AUTHORITIES**

**SENIOR HIGH SCHOOL (SMA) STATE 10 PADANG**

**Jln: Situjuh Padang Tel. (0751) 27331 Fax. (0751) 840882 Website: http://www.sman10-padang.sch.id Postal: 25 129**

**LESSON PLAN (RPP)**

School : High School

Subjects Physics

Class / Semester : X / 2

Subject matter : Heat Transfer

Time Allocation : 3 x 45 Minutes

1. **Core Competencies**

|  |  |
| --- | --- |
| KI 1  | Appreciate and practice the teachings of their religion |
| KI 2 | Appreciate and practice the honest behavior, discipline, responsibility, caring (gotong royong, cooperation, tolerance, peace), polite, responsive and pro-active and displayed as part of the solution to various problems in interacting effectively with the social and natural environment as well as in placing itself as a reflection of the nation in the association world |
| KI 3 | Understand, apply, analyze the factual knowledge, conceptual, procedural based flavor ingintahunya about science, technology, art, culture, and humanities with insights into humanity, nation, state, and civilization-related causes of phenomena and events, as well as applying procedural knowledge in the field of study specific according to their talents and interests to solve the problem |
| KI 4 | Processing, reasoning, and menyaji in the realm of the concrete and the abstract realm associated with the development of learned in school independently, and able to use the method according to the rules of science |

1. **Basic Competencies and Indicators**

|  |  |  |
| --- | --- | --- |
| 1.1 |

|  |
| --- |
| Recognizing the greatness of God who created and governs the universe through observations of natural phenomena of physical and measurement |

 |
| 1.2 | Recognizing the greatness of God that govern the characteristics of the phenomenon of motion, fluid, heat and opticsIndicator:1. Kebasaran realize God for favors that the biggest source of energy on earth comes from the sun. Solar energy can be down to earth in the form of a beam of light (radiation)
 |
| 2.1 | Shows the behavior of scientific (curiosity; objective; honest; careful; meticulous; diligent; careful; be responsible; open; critical; creative; innovative and caring environment) in their daily activities as a form of implementation of the attitude in the trials, reports, and discussionIndicator:1. Show impartiality in the activities conducted experiments
2. Show discipline in the activities discussed
3. Shows the attitude of responsibility in the activities of the experiment, report and discuss
4. Show tolerance in discussion activities
 |
| 3.8 | Analyze the effects of heat and heat transfer in everyday lifeindicators:1. Distinguishing events of heat transfer by conduction, convection and radiation
2. Determining the factors that influence the events of heat transfer by conduction, convection, and radiation
3. Provide examples of events conduction, convection, and radiation in daily life
 |
| 4.8 | Plan and carry out experiments to investigate the thermal characteristics of a material, especially the capacity and thermal conductivityIndicator:1. Do a simple experiment of heat transfer by conduction, convection, and radiation
 |

1. **Learning objectives**

|  |
| --- |
| 1. After the activity observed in the daily life of students is expected to realize the greatness of God for the grace that is given bahwasinar sun reach the Earth by radiation
2. After observing the activity, ask, try, reason and communicate in the learning activities of heat transfer students are expected to behave in an honest, self-discipline, responsibility and tolerance
3. After observing the activity, ask, try and make sense of heat transfer in the learning activities students are expected to membedakanperpindahan heat by conduction, convection and radiation correctly
4. After observing activities, try, reason and communicate in the learning activities of heat transfer student should be able to determine the factors that affect heat transfer by conduction, convection and radiation to the right
5. After the events tried, reason, and communicate the heat transfer in the learning activities of students is expected to give an example of the event conduction, convection, and radiation in daily life.
6. After observing and propose activities in the learning activities of heat transfer students are expected to perform a simple experiment by conduction, convection, and radiation
 |

1. **Learning materials**

|  |
| --- |
| **Heat Transfer*** Sun The earth energe source
* Solar energy can be down to earth in the form of a beam of light
* Heat is moving from a high-temperature object to a low-temperature objects
* Heat transfer is known so far there are three kinds:
* Conduction

Heat transfer by conduction is heat transfer without the intermediary substance (conductor). The amount of heat flowing per second conductor is:Information : = Heat flow per second (cal / s or A / S) A = surface area of ​​the conductor (m2)  k = thermal conductivity W / mK= Change in temperature (oC) = t2 - t1 * Convection (flow)

Heat transfer by convection is accompanied by the displacement of heat transfer agent for, usually occurs in the gas cairdan substance.* Large heat flow per unit time in the convection is:

h = coefficient of thermal convection (J / S.m2.K)* Radiation (emission)

Perpindahankalorsecararadiasiadalahperpindahankalorsecarapancarantanpazatperantara.* Besarenergi that dipancarkandirumuskan with:

4=  With: e = emisifitasbenda; 0 ≤ e ≤ 1 T = the absolute temperature (K) A = surface area (m2) P = radiant power (W)  = Constant Stefon - Boltzmann = 5.67. 10-8 W / m2.K4* Carry out simple experiments on heat transfer by conduction, convection, and radiation
 |

1. **Learning methods**

|  |  |  |
| --- | --- | --- |
| Model | : | * Cooperative Learning
 |
| Approach | : | * scientific
 |
| Method | : | * Lecture
* demonstration
* Discussion
* Experiment
 |

1. **Media, tools and learning resources**

|  |  |  |
| --- | --- | --- |
| 1. | Media | Power point |
| 2. | Equipment / Materials |

|  |  |
| --- | --- |
| First Event | Wood, iron, and aluminum, candles, burners spritus, leg braces three and gauze |
| Both activities | Beaker, three leg braces, spritus burners, water, sawdust, gauze, gas convection tool, lighters, insect repellent and candles |
| Third activity | A tin cans, black paint, and boiling water |

 |
| 3. | Learning Resources | * Aip Saparudin. 2009.Praktis Studying Physics for Class X SMA / MA. Jakarta: Book Center, Department of Education (pp 107-124)
* Dudi Indrajit. 2009.Mudah and Active Learning Physics for Class X SMA / MA.Jakarta: Book Center, Department of Education (pp 147-167)
* Marthen Kanginan. 2007.Fisika 1 for High School Class X. Cimahi: Erland (pp 217-264)
* Setya Nurachmandani. 2009. Physics 1 for SMA / MA Class X. Jakarta: Book Center, Department of Education (pp 149-174)
* Sri Handayani. 2009. Physics 1: For SMA / MA Class X. Jakarta: Book Center, Department of Education (145-160)
 |

1. **Learning Activities**

| **Details of activities** | **Time** |
| --- | --- |
| **preliminary** |  |
| * Prepare students psychologically and physically to follow the learning process of heat transfer material
* Asking students lined up in front of the classroom and into the classroom on a regular basis while greeting
* Ask the class leader leads a prayer before the learning begins
* Check student attendance
* Giving students motivation contextually appropriate teaching material benefits and applications in daily life, by giving examples in everyday life
* You'll often see the refrigerator at home, why freezer refrigerator is always located at the top?
* Have you ever seen the air conditioner mounted on the bottom (near the floor)?
* Asking questions prior knowledge linking with the material to be studied
* If the hot object is contacted with a cold object what would happen?
* What is the heat?
* Heat is passed from temperature how?
* Explaining the purpose of learning about the heat transfer material
* After observing the activity, ask, try, reason, and communicate the students are expected to distinguish the heat transfer by conduction, convection, and radiation through experiments related in daily life
* Delivering coverage of heat transfer materials and learning activities appropriate description explanation syllabus
 | 15 minutes |
| **Core activities** |  |
| ***Observe**** Memintasiswa observe demonstrations
* Put a teaspoon in a glass of hot tea, what do you feel when holding the handle of a spoon
* When you boil water in a pot, how the movement of air (bubbles) when it begins to boil?
* Motorcycle parked in the open on a hot afternoon. When touched the seat what do you feel?
* Asking students membacahandouttentang heat transfer by conduction, convection and radiation in groups
* Divide the students dalambeberapakelompokkecil, each group consisting of 4-5 people.

***Ask**** Membimbingkelompokuntukmengajukan question-pertanyaantentang perbedaanperpindahan heat by conduction, convection and observations radiasidari demonstrations.

***Try**** Request siswauntuk conduct experiments on secarakonduksi heat transfer, convection, and radiation in groups

***Reasoning**** Provide an opportunity for each group to discuss the differences of heat transfer by conduction, convection and radiation as well as factors that affect heat transfer by conduction, convection, and radiation

***Communicating*** * Memintaperwakilandarikelompokmenyampaikanhasildiskusi of heat transfer by conduction, convection, and radiation
 | 105menit |
| **Cover*** Guiding students to explain the benefits of heat transfer by conduction, convection, and radiaasi in everyday life
* Guiding the students concluded the material of heat transfer by conduction, convection, and radiation
* Provide feedback on the learning process and results in heat transfer material
* Delivering learning activities planned for the next meeting
 | 15 minutes |

1. **appraisal**
2. Type / TeknikPenilaian

Tesdan Non Tests

1. BentukInstrumendanInstrumen
	1. ratings attitude
* Rate observation
* Self-assessment
* Rate peers
* Ratings daily journal educators
	1. assessment of knowledge
* essay
	1. skills assessment
* Performance assessment

|  |  |  |
| --- | --- | --- |
| KnowingSMAN 10 PadangDra. Welita, MM.NIP. 2002 19610531 198603 | Vice CurriculumHaryanti, M.PdNIP. 2002 19680717 199512 | Padang, May 28, 2015Subject Teacher of PhysicsDesmalinda, M.PdNIP.19671205 199 702 2001 |

**Attachment assessment guidelines**

1. ratings attitude
2. Rate observation

ASSESSMENT OF OBSERVATION

Subjects Physics

Class / Specialization : X / MIA

Subject matter : Heat Transfer

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Name | Scores for attitude | Total score | Value | Predicate |
| Honest | Discipline | bearanswer | Tolerance |
| 1 |  |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |
| dst |  |  |  |  |  |  |  |  |

Padang, 2014

Observer

(............................)

Guidelines scoring rubric

Put a checkmark (v) in the score column corresponding spiritual attitude displayed by learners, with the following criteria:

4 = always, if always perform according to a statement

3 = frequently, if often appropriate statements and

 sometimes it does not do

2 = sometimes, if sometimes do and

 often does not do

1 = never, if never do

* be honest

|  |  |  |
| --- | --- | --- |
| No. | aspects Observations | Score |
| 1 | 2 | 3 | 4 |
| 1 | Do not cheat in doing the test / quiz / assignment |  |  |  |  |
| 2 | Not taking the data of others in doing any task |  |  |  |  |
| 3 | The reported data or information as it |  |  |  |  |
| 4 | Admit mistakes or weaknesses of |  |  |  |  |

Hint scoring:

The final score using a scale of 1 to 4

Calculation of the final score using the formula:

$$\frac{Skor diperoleh}{SkorMaksimal}x 4=skorakhir$$

* Discipline

|  |  |  |
| --- | --- | --- |
| No. | Attitude observed | Do |
| Yes | No |
| 1 | Go to class on time |  |  |
| 2 | Collect assignments on time |  |  |
| 3 | Conduct in the following study |  |  |
| 4 | Following laboratory in accordance with the steps set |  |  |
| amount |  |  |

Hint scoring:

Answer YES was given a score of 1, and the answer is NOT given a score of 0

Calculation of the final score using the formula:

$$\frac{Skor}{SkorTertinggi}x 4=skorakhir$$

* Responsible

|  |  |  |
| --- | --- | --- |
| No. | aspects Observations | Score |
| 1 | 2 | 3 | 4 |
| 1 | Carry out individual tasks well |  |  |  |  |
| 2 | Do not accuse anyone without proof of accurate |  |  |  |  |
| 3 | Mengembalikanbarang borrowed |  |  |  |  |
| 4 | Apologized for mistakes made |  |  |  |  |
| Total score |  |  |  |  |

Hint scoring:

The final score using a scale of 1 to 4

Calculation of the final score using the formula:

$$\frac{Skor diperoleh}{SkorMaksimal}x 4=skorakhir$$

* Tolerance

| No. | aspects Observations | Score |
| --- | --- | --- |
| 1 | 2 | 3 | 4 |
| 1 | Respecting the opinion of friends |  |  |  |  |
| 2 | Accept a deal although they differ with his opinion |  |  |  |  |
| 3 | Accept the shortcomings of others |  |  |  |  |
| 4 | Mememaafkan mistakes of others |  |  |  |  |
| Total score |  |  |  |  |

The final score using a scale of 1 to 4

Calculation of the final score using the formula:

$$\frac{Skor diperoleh}{SkorMaksimal}x 4=skorakhir$$

SesuaiPermendikbud No. 81A In 2013 learners obtain the value is:

Very good : When given a score: 3.33 <score ≤ 4.00

Good : When given a score: 2.33 <score ≤ 3.33

Enough : When given a score: 1.33 <skor≤ 2.33

Less : When given a score: score ≤ 1.33

1. Self-assessment

SELF ASSESSMENT SHEET

Subjects Physics

Class / Specialization : X / MIA

Subject matter : Heat Transfer

*Read carefully - better every revelation and mark) in the column corresponding to the state of the real you!*$(√$

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Statement | Yes | No |
| 1 | I was able to distinguish the concept of heat transfer by conduction, convection, and radiation |  |  |
| 2 | In the experiment, I assemble the appropriate tools and materials lab guides |  |  |
| 3 | Sayabertanggungjawabdalamkegitanpembelajaran |  |  |
| 4 | Sayabertoleransiterhadaptemandalammelakukandalam experiment and diskusikelompok |  |  |
| 5 | I understand the concept of heat transfer by either |  |  |
| 6 | Data Sayajujurdalammemberikan hasilpercobaan |  |  |
| 7 | Sayamenghargaipendapattemandalamberdiskusidanpresentasi |  |  |

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Recapitulation of the self-assessment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Name | Scores for statement number | Total score | value attitudes | predicate |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | dst |
| 1 |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |  |  |  |  |
| dst |  |  |  |  |  |  |  |  |  |  |  |  |

Value = x 100$\frac{Total skor perolehan}{7}$

1. Rate peers

ASSESSMENT SHEET peers

Subjects Physics

Name learners to observe :

Class : X

Observation time :

|  |  |  |
| --- | --- | --- |
| No. | Behavior / Attitude | Appears / do |
| Yes | No |
| 1 | Appreciating the opinion of friends  |  |  |
| 2 | Willing to accept the opinion of friends |  |  |
| 3 | Giving another chance to ask your friends |  |  |
| 4 | Provide solutions to the conflicting opinions |  |  |
| 5 | Can cooperate with friends of different social status, ethnicity and religion |  |  |
| 6 | Responsible in learning activities |  |  |
| dst |  |  |  |

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(............................)

Recapitulation Ratings Friends BFFs

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Students observed name | NamaPengamat | Skorpernyataan No. | Score  | Value |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |  |
| 1 |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |  |  |  |  |
| dst |  |  |  |  |  |  |  |  |  |  |  |  |

Value = x 100$\frac{Total skor perolehan}{6}$

1. Daily Rate educators

DAILY JOURNAL EDUCATION ASSESSMENT SHEET

Subjects Physics

Class / Specialization : X / MIA

Subject matter : Heat Transfer

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Date and time | Names of Students | Events (positive or negative) | Follow-up |
| 1 |  |  |  |  |
| 2 |  |  |  |  |

The final assessment attitude



1. assessment of knowledge
2. Essay

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | **Question** | **Answer key** | **Weight** |
| 1 | Consider the following picture!D:\PPG\tugas PPG\perpindahan kalor\indexhh.jpgThe tip of a spoon held over time will feel the heat. Why does this happen? Explain! | The occurrence of heat transfer by conduction.The tip is heated causing the kinetic energy of the particles becomes larger, so that the kinetic energy given to the adjacent particles through collisions. Therefore, the particles to vibrate and the greater the kinetic energy increases. Large kinetic energy is given to the particle-partikeldi next to it, and so on. | 5 |
| 2 | Describe factors that can affect the rate of heat conduction! | Factors-factors that can affect the rate of heat conduction:1. The temperature difference (ΔT) between the two surfaces; the greater the temperature difference, the faster the heat transfer
2. The wall thickness (d); the thicker the wall, the slower the heat transfer
3. The surface area (A); the greater the surface area, the faster the heat transfer
4. The thermal conductivity of substances (k); the greater the value of k, the faster the heat transfer
 | 5 |
| 3 | Explain how the land breeze! | At night, the cold ground faster than the sea, so that the air above the land is cooler than the air above the sea. Therefore, the air above the sea rose and was replaced by air over the land, so that there was a land breeze. | 5 |
| 4 | How does heat energy from the sun can be through the Earth's atmosphere and warms the Earth? | Heat energy is carried in the form of electromagnetic waves from the sun to the earth through a vacuum without an intermediary agent.  | 5 |
| 5 | Why is the surface of the flask by the shiny silver lining? | Because the shiny surface is absorbing and emitting heat is bad. Thus the hot water stored in a thermos will be longer lasting heat. | 5 |
| 6 | Determine how the speed of heat flow through a window with a size of 1.5 mx 1.2 m and 3.0 mm thick, if the temperature at the inner and outer surfaces of each of 20oC and 15oC! (Glass conductivity coefficient of 0.8 J / (ms K)) | diskette:A = 1.5 mx 1.2 m = 1.80 m2ΔT = 20oC - 15oC = 5 ° C d = 3.0 mm = 3.0 x 10-3 m k = 0.8 J / (ms K)DIT:H = ... ..?Answer:H = $\frac{k A ∆T}{d}$$$ = \frac{0,8 x 1,8 x 5}{3 x 10^{-3}}$$ = 2400 J / (ms K) | 20 |
| 7 | The air in a room temperature of 25 ° C, while the surface temperature of 15oC room glass window. Determine the rate of heat received by the glass windows covering an area of ​​0.6 m2, if the temperature coefficient of convection at 7.5 x 10-5 cal / (s cm2oC)! | diskette:ΔT = 25oC - 15oC = 10oCA = 0.6 m2 = 6.000 cm2h = 7.5 x 10-5 cal / (s cm2oC)DIT:H = ....?Answer:H = h A ΔT = 7.5 x 10-5 x 6,000 x 10 = 4.5 cal / s | 10 |
| 8 | An object has a perfectly black surface, temperature of 27oC. Determine the energy emitted per unit time per unit surface area of ​​the object! | diskette:T = (27 + 273) K = 300 Ke = 1$σ$ = 5.67 x 10-8 W m-2 K-4DIT:E = ....?Answer: E = $eσAT^{4}$ = 1 x 5.67 x 10-8 x 300 = 459.27 W / m2 | 10 |
| 9PQ90oC0 ° C | Two rods P and Q with the same size but made of different metals brought closer, as the pictureP left end and right end temperature of 90 ° C temperature of 0 ° C Q. If the coefficient of thermal conduction thermal coefficient P twice Q, determine the temperature at the boundary of P and Q! | diskette:dP = dQTP = (90 + 273) K = 363 KTQ = (0 + 273) K = 273 KAP = AQ = AKP = 2 kDIT:TPQ = ... ..? Answer:HP = HQ$\frac{k\_{P } A ∆T\_{P}}{d\_{P}}$ = $\frac{k\_{P } A ∆T\_{Q}}{d\_{Q}}$$$\frac{2k\_{Q } A \left(363 K-T\_{PQ}\right)}{d\_{Q}}= \frac{k\_{Q } A \left(T\_{PQ}-273\right)}{d\_{Q}}$$$$2 \left(363 K-T\_{PQ}\right)= \left(T\_{PQ}-273\right)$$$$726-2T\_{PQ}= T\_{PQ}-273$$$$3T\_{PQ}=999$$$$T\_{PQ}=333 K$$ | 20 |
| 10 | Two rods A and B are similar in length to 1: 2, penampangnya versus 4: 3. If the temperature difference ends of the two the same stem, then determine the ratio of the amount of heat per unit time propagation of the A and B! | diskette:kA = kB2da = dB 3AA = 4AB$$∆T\_{AB}= ∆T\_{BA}$$DIT: HA: HB = ... ..?Answer:HP: HQ$$\frac{k\_{A }A\_{A } ∆T\_{AB}}{d\_{A}} : \frac{k\_{B}A\_{B } ∆T\_{BA}}{d\_{B }}$$$$\frac{k\_{B }\frac{4}{3}A\_{B } ∆T\_{AB}}{\frac{1}{2}d\_{B}} : \frac{k\_{B}A\_{B } ∆T\_{BA}}{d\_{B }}$$$$\frac{4}{3} : \frac{2}{1}$$4: 6 2: 3 | 15 |
| **AMOUNT** | 100 |

Information :

**Student scores** = x 100

1. skills assessment

PERFORMANCE ASSESSMENT

Subjects Physics

Class / Specialization : X / MIA

Subject matter : The transfer of heat

|  |  |  |
| --- | --- | --- |
| **CRITERIA** | **SCORE** | **Tot****Score** |
| **1** | **2** | **3** |
| **A. PHASE PREPARATION** |  |
| * + - 1. Taking the tools that had been prepared for the experiment of heat transfer by conduction, convection, and radiation
 |  |  |  |  |
| **B.TAHAP IMPLEMENTATION** |  |
| 1. Shows that the metal including the conductor for heat transfer
 |  |  |  |  |
| 1. Shows the heat transfer by convection in liquids
 |  |  |  |  |
| 1. Shows that black surfaces emit radiation better than shiny surfaces
 |  |  |  |  |
| **C. PHASE RESULTS** |  |
| 1. Analyzing / processing experiment data
 |  |  |  |  |
| 1. Pelaporandarianalisis experiment data telahdilakukan
 |  |  |  |  |
| 1. Ability to conclude the experimental results fit the concept
 |  |  |  |  |
| **TOTAL SCORE** |  |

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(............................)

*give a sign) in accordance with the score obtained by the students.*$(√$

Ideal Maximum Score: 25

**Practical value** = x 100

Description of scoring:

1 = Not Exactly

2 = Less Right

3 = Right